

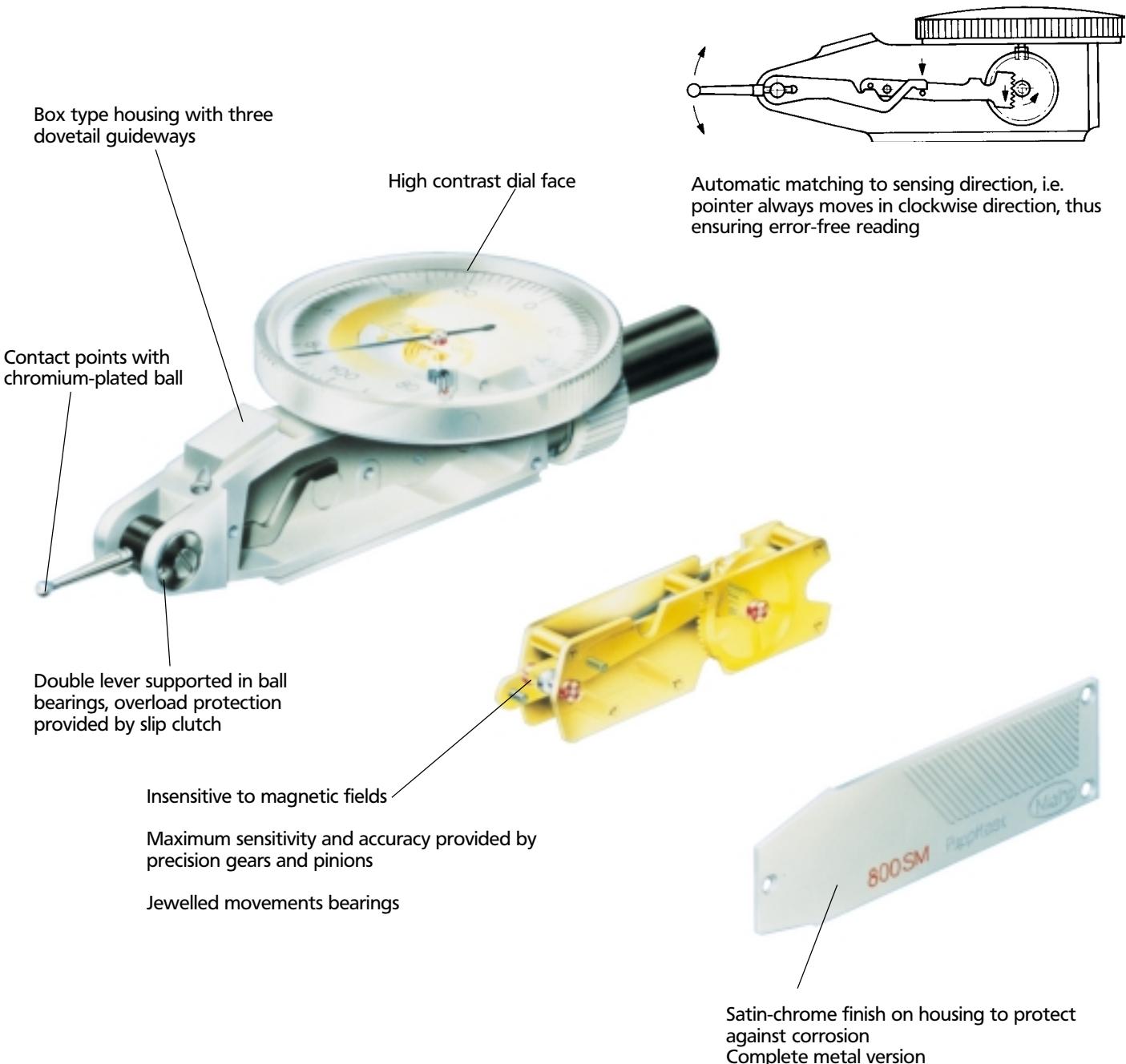
MarTest. Test Indicators

MarCator. Dial Indicators

Millimess®. Dial Comparators

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Design features of Mahr Test Indicators

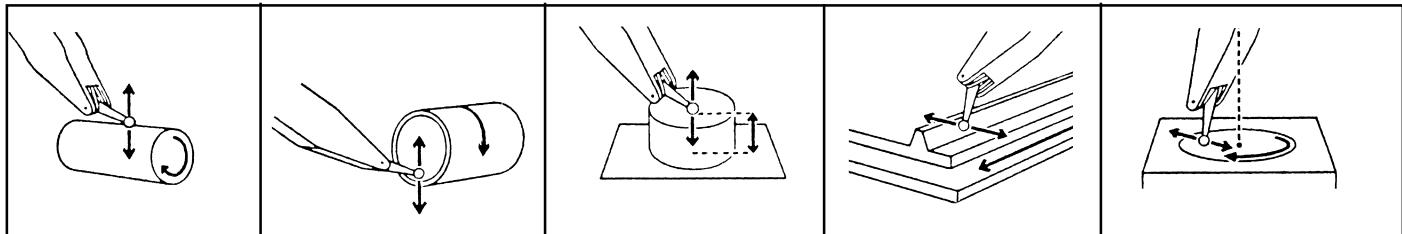


Applications

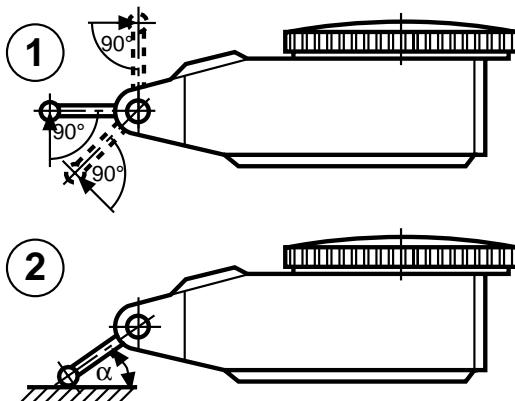
The test indicator serves as an instrument for comparative measurements. It can be used in any type of measuring stand. Due to the swivelling feature of the probe and the reversal of its sensing direction, the Mahr Test indicator is suitable for many measuring and checking tasks.

Areas of application i.e.:

- run-out and concentricity checks of shafts and bores
- checks of parallelism and alignment of flat faces in engineering and tool making



References to application:



For accurate measurements the axis of the contact point must be perpendicular to the measuring direction. If this is not possible, it is necessary to multiply the reading on the dial with a correction factor, which depends on angle α . The correction factor is negligible for angles below 15°.

Angle α	15°	30°	45°	60°
Corr. factor	0.96	0.87	0.70	0.50

Example:

Angle α :	30° (estimated)
Reading on dial:	0.38 mm
Meas. value:	$0.38 \times 0.87 = 0.33 \text{ mm}$

Test Indicators 800

Style 1
Standard model



Style 2
Extra-large dial face



Style 3
Extra-long stylus



Style 4
with high resolution



Style 5
Stylus moves parallel
to dial



Style 6
with mm/inch Scale

Technical Data

Style	Measuring range	Readings	Dial dia.	Swivel-range of styluses	Measuring force	Accuracy			Order no.	
						f_e	f_{ges}	f_u		
800 S	1	$\pm 0.4 \text{ mm}$	0.01 mm	27.5 mm	12 mm	0.15 N	10 μm	13 μm	3 μm	
800 SG	2	$\pm 0.4 \text{ mm}$	0.01 mm	38 mm	12 mm	0.15 N	10 μm	13 μm	3 μm	
800 SL	3	$\pm 0.4 \text{ mm}$	0.01 mm	27.5 mm	36 mm	0.07 N	10 μm	13 μm	5 μm	
800 SM	4	$\pm 0.1 \text{ mm}$	0.002 mm	38 mm	11.5 mm	0.15 N	3 μm	4 μm	2 μm	
800 W	5	$\pm 0.4 \text{ mm}$	0.01 mm	27.5 mm	13 mm	0.3 N	10 μm	13 μm	5 μm	
800 SGI	6	$\pm 0.3 \text{ mm} (\pm 1.5 \text{ in})$	0.01 mm (0.0005 in)	38 mm (1.5 in)	11.5 mm (.45 in)	0.15 N	.0004 in	.0005 in	.00012 in	4307106
+M-101	1	$\pm .015 \text{ in}$	.001 in	1.1 in	.45 in	0.15 N	.0004 in	.0005 in	.00012 in	2014859
+M-109	1	$\pm .015 \text{ in}$	.0005 in	1.1 in	.45 in	0.15 N	.0004 in	.0005 in	.00012 in	2014863
+LM-109	2	$\pm .015 \text{ in}$	.0005 in	1.5 in	.45 in	0.15 N	.0004 in	.0005 in	.00012 in	2014856
+M-111	1	$\pm .015 \text{ in}$	.0005 in	1.1 in	1.35 in	0.07 N	.0004 in	.0005 in	.0002 in	2014864
+LM-111	2	$\pm .015 \text{ in}$	.0005 in	1.5 in	1.35 in	0.07 N	.0004 in	.0005 in	.0002 in	2014857
+M-102	4	$\pm .004 \text{ in}$	.0001 in	1.1 in	.45 in	0.15 N	.00012 in	.00016 in	.00008 in	2014860
+LM-102	4	$\pm .004 \text{ in}$	.0001 in	1.5 in	.45 in	0.15 N	.00012 in	.00016 in	.00008 in	2014853
+LM-150	4	$\pm .004 \text{ in}$	.00005 in	1.5 in	.45 in	0.15 N	.00012 in	.00016 in	.00008 in	2014910
M-181	1	$\pm .015 \text{ in}$	.0005 in	1.1 in	.47 in	0.30 N	.0004 in	.0005 in	.0002 in	4303915
+M-104	1	$\pm .4 \text{ mm}$	0.01 mm	27.5 mm	12 mm	0.15 N	10 μm	13 μm	3 μm	2014862
+LM-104	2	$\pm .4 \text{ mm}$	0.01 mm	38 mm	12 mm	0.15 N	10 μm	13 μm	3 μm	2014855
+M-123	4	$\pm .1 \text{ mm}$	0.002 mm	27.5 mm	11.5 mm	0.15 N	3 μm	4 μm	2 μm	2014865
+LM-123	4	$\pm .1 \text{ mm}$	0.002 mm	38 mm	11.5 mm	0.15 N	3 μm	4 μm	2 μm	2014858
+M-103	1	$\pm .25 \text{ mm}$	0.01 mm	27.5 mm	12 mm	0.07 N	10 μm	13 μm	5 μm	2014861
+LM-103	2	$\pm .25 \text{ mm}$	0.01 mm	38 mm	12 mm	0.07 N	10 μm	13 μm	5 μm	2014854

+ Furnished with swivel clamp and holding bar.

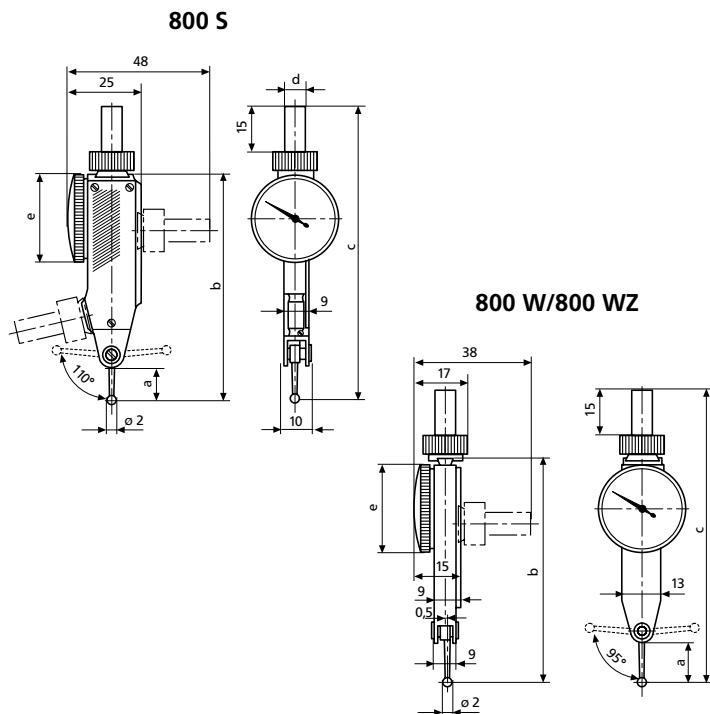
Standard accessories:

Mounting shank 8h6 mm and 1/4" (For instruments with Inch-scale),
stylus dia. 2 mm and plastic case

Technical Data

Dimensions	a	b	c	d	e
mm					
800 S	12	76	99	8h6	29
800 SG	12	76	99	8h6	40
800 SL/M-103	36	100.5	123.5	8h6	29
LM-103	36	100.5	123.5	8h6	40
800 SM	11.5	76	99	8h6	40
800 W	13	73	96	8h6	29
800 SGI	11.5	76	99	8h6**	40
M-101/M-109	11.5	76	99	8h6**	29
M-104/M-123	11.5	76	99	8h6**	29
LM-109/LM-104	11.5	76	99	8h6**	40
LM-123	11.5	76	99	8h6**	40
M-111	34	98.5	121.5	8h6**	29
LM-111	34	98.5	121.5	8h6**	40
M-102	12	76	99	8h6**	40
LM-102/LM-150	12	76	99	8h6**	40
M-181	12	72	95	8h6**	29

** Furnished with both 8h6 mm and .250 in mounting shafts



Accessories

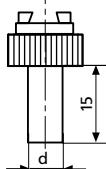
for types	Stylus length / in mm	801 te carbide ball ball dia. in mm			801 tl carbide ball ball dia. in mm	801 tr, with ruby ball ball dia. in mm
		ø 1	ø 2	ø 3		
800 S / 800 SG/800SM	16.1	4309015	4309016	4309014		4309088
M-101/M-109/LM-109	16.1	4309015	4309016	4309014		4309088
M-104/LM-104	16.1	4309015	4309016	4309014		4309088
M-102/LM-102/LM-150	16.1	4309015	4309016	4309014		4309088
800 W	16.85	4309011*	4309012*	4309013*		4309030
M-181/M-123/LM-123	16.1	4309015	4309016	4309014		4309088
800 SGI	16.1	4309015	4309016	4309014		4309088
800 SL/M-103/LM-103	40				4309031	4309022
M-111/LM-111	38					4309921

* steel ball

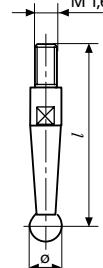
Mounting shaft 801 a		
Mounting shaft dia. d	Order no.	
801 a8	8h6 mm	4300800
801 a4	4h6 mm	4300801
801 a.250in	.250in (6.35 mm)	4300805

Order no.		
Spanner for changing styluses		4309040
Adapter bush for adapting mounting shank dia. 8h6 mm to inch bore .375in	940	4310103

801 a

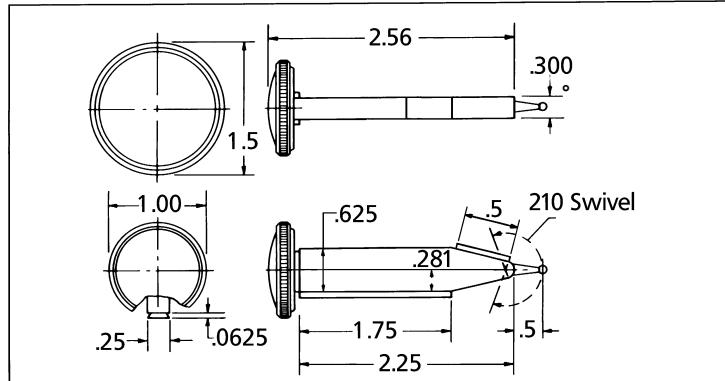
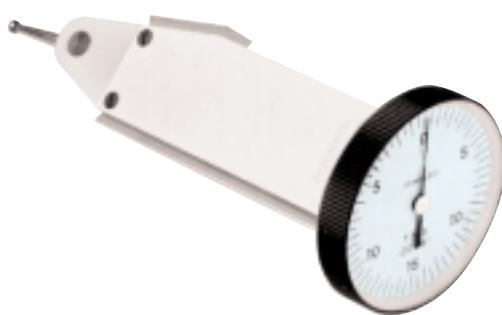


801 t*



* M2 on stylus for
800 SL / M-111 / LM-111

End Mounted Dials



Dimensions in inches

Technical Data

Order number	Range	Marking	Graduation value	Dial diameter	Repeatability	Calibration Accuracy
Inch Reading						
T-105	.030	0-15-0	.0005	1	±.0001	.0005
T-106	.008	0-4-0	.0001	1.5	±.00002	.0001
LT-113	.008	0-4-0	.00005	1.5	±.00002	.0001
Metric Reading (mm)						
T-108	0.08	0-0.4-0	0.01	28	±0.002	±0.01

- Testmaster indicators with end mounted dials come with contact point (**PT-5653**), 12.5mm/1/2in long with a carbide tip 2mm/.080in diameter, a universal dovetail mounting attachment, contact point wrench and a Certificate of Accuracy and Traceability in a fitted case.

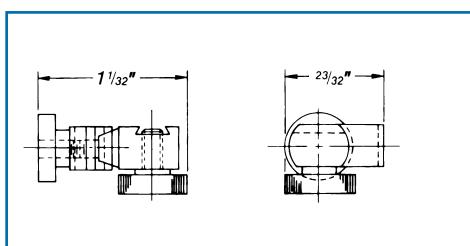
Testmaster Test Indicators — Contact Points

For use with styles T-105, T-106, LT-113 & T-108

Order number	Length X Tip diameter	Ball material
PT-5652	12.5 x 1mm/.500in x .040in	Carbide
PT-5646	12.5 x 1mm/.500in x .040in	Steel
PT-5653	12.5 x 2mm/.500in x .080in	Carbide
PT-5647	12.5 x 2mm/.500in x .080in	Steel
PT-5654	12.5 x 3mm/.500in x .120in	Carbide
PT-5651	12.5 x 3mm/.500in x .120in	Steel
PT-5648	12.5 x 3mm/.500in x .120in	Steel

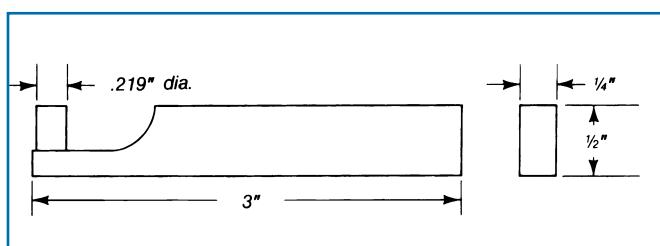
8m 1.4 x 0.3 Thread - for above styles

Versatility for mounting all Testmaster Indicators



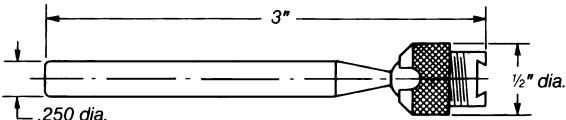
Swivel Clamp (normally furnished) Allows Testmaster to be mounted on most Indicator stands and fixtures. Order **CP-2199**

- Test Stands - see next page.
- For Special Holding Bars and Height Stands – call Mahr Federal Customer Resource Center 1-800-333-4243.



Holding Bar (normally furnished) Three-inch length provides ample reach for most applications. Order **HB-2157**

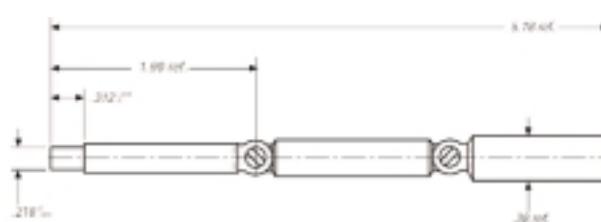
Optional Mounting Accessories for Testmasters



Ball Clamp

Dovetail and ball for indicator mounting and omnidirectional orientation.

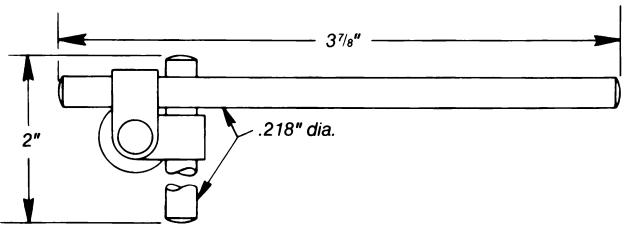
Order no. AT-50



Double-jointed Clamp

Reaches up to 127mm/5in with easy positioning for many applications including Milling Machines and Jig Borers.

Order no. AT-100



Jig Borer Attachment

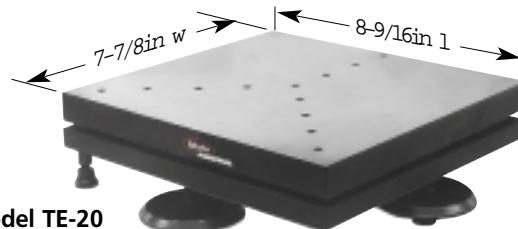
Furnished with two rods and clamp for fast machine mounting.

Order no. RD-21

Leveling Table

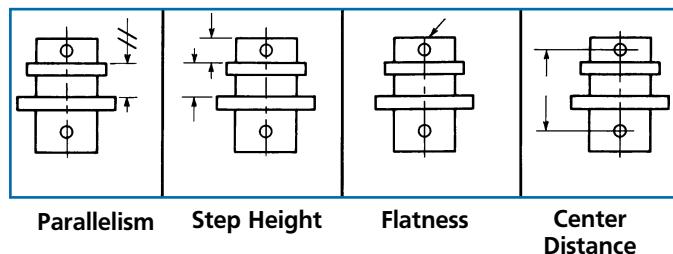
Cuts set-up time 60% or more for many height gage measurements.

- Mahr Federal's leveling table, TE-20, permits you to quickly bring the surface of a part into alignment with a surface plate in both planes. Completely eliminates shimming. Saves so much time that, used only occasionally, it will pay for itself in two weeks.
- The top plate is stress-relieved steel providing about 67 square inches of work area. It is drilled and tapped for fixtures. Fine pitch screws and large knobs assure precisely controlled adjustments. Works with any type of height gage.



Model TE-20

- Operation is simple. Height gage readings are taken at edges of the surface to be aligned. Each plate, independently adjustable at right angles to the other, is angled as required for precise alignment. Flatness = .025mm/.001in



Adjustment	Top Plate	Bottom Plate
Total	$\pm 1^{\circ}30'$	$\pm 1^{\circ}30'$

Typical checks which require careful positioning of work because rest surface is not sufficiently parallel to other work surfaces.

Leveling Table compensates for error quickly, drastically reduces set-up time.

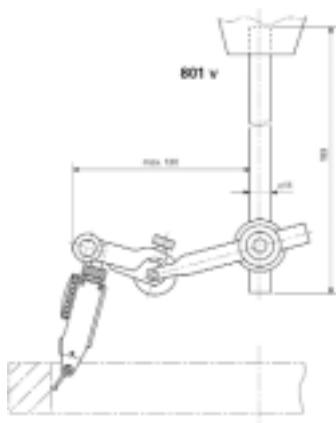
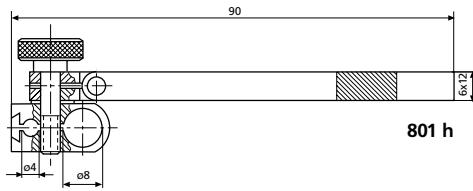
Test Indicators per DIN 2270

Accessories

Universal Holder 801 h

- For mounting test indicators on machine tools
- With swivel-type knuckle

Order no. 4309066



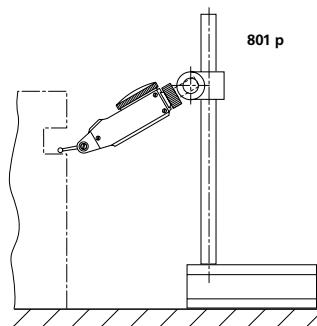
Centering Support Rods 801 v

- For aligning and centering workpieces on machine tools
- Swivel mounting clamp and fine adjustment
- Stainless steel rods

Mounting

Bore diameter 8mm
Swivel range of mounting clamp 180°

Order no. 4309070



Stand 801 p

- With swivel holder
- Base with 140° V-groove

Overall height 150mm
Bore diameter 4 and 8mm
Column diameter 8mm
Base surface 65 x 40mm

Order no. 4309090

Test Stands 1492 Magnetic Base

Features

- Use with any Testmaster Indicator - Support arms stepped at one end (.218in dia.) for Swivel Clamp (CP-2199).
- Accommodates Vertical and Horizontal lug back mounts for AGD type Indicators.
- Bases have powerful "ON/OFF" permanent magnets which hold from any of four faces - three sides or bottom.

Technical Data

Order No.	Base dimensions	Main Post		Support Arm	
		Length	Diameter	Length	Diameter
1492B-5	60x48x59/2.4x1.9x2.2 h	178/7	10/.47	165/6.5	9.9/.39
1492B-10	60x48x59/2.4x1.9x2.2 h	178/7	10/.47	149/5.9	9.9/.39
1492B-15	114x48x59/4.5x1.9x2.2 h	401/15.8	20/.79	200/7.9	14/.55

Measurements are mm/in.

All models furnished with post clamp and indicator mounting clamp.

Style 1492B-10 has fine adjustment on post clamp.

Indicator not included.



1492B-10
Test Stand (Indicator not included)

Dial Indicators per ANSI/AGD**Features****You get more with Mahr Federal Dial Indicators**

- Proven for the most demanding applications
- Superior design and serviceability
- Unmatched customer and technical support
- Catalog and customized styles
- Full range of accessories to suit virtually every need



- Unit construction, removable movement ... saves repair/cleaning time and maintenance costs
- Hardened gears and stainless steel racks provide lasting protection against indicator failure due to shock or wear
- Jeweled bearings resist friction, add to longer indicator life
- Skeletonized, hobbed gears for more sensitive response, superior indicator accuracy with minimal hysteresis error
- Soft-tinted dials (green, inch, or yellow, metric) minimize eye strain
- Special steel alloy, balanced dial hand affords no-shift, precise reading
- Controlled rack and pinion mesh eliminates slope for precise response and reading
- Smooth-adjusting bezels for easy setup
- Positive pressure pull-back spring ... less maintenance
- Compliance with ANSI/AGD dimensional and accuracy specifications

How to order

How to Order Your Dial Indicator and Accessories –

1. **Select the type of Indicator you require.** Check the specialized types as well as regular ANSI/AGD models.
2. **Choose the Model** best suited to the magnification, range and viewing needs of your job.
3. **Accessories.** These are important because they greatly increase the speed, efficiency and convenience of obtaining desired results. A wide selection of Mahr Federal dial indicator accessories are shown in this catalog.
4. **Options.** You are not restricted to the normally furnished equipment mentioned above. A wide choice of optionally available points, backs or dial arrangements can be specified at little or no extra cost. We maintain the most extensive stock of indicators and gages for dimensional measurement available anywhere. Items which are in stock are normally shipped within five working days. If you need them sooner, inquire when ordering. We can often make next-day deliveries. Understandably, some of the items in this catalog are not always in stock or are special order items, which take a little longer to ship.

If you need help in determining what Indicators right for your application, just ask us. Contact Mahr Federal Customer Resource Center:

1-800-333-4243

One of our experienced professionals will give you courteous, professional advice that can save you time and money.

Replacement indicators

Although Mahr Federal dial indicators are known for their lifetime service, it is not uncommon to change an indicator back, contact point, dial or to even add an accessory to suit your latest application.

When ordering a replacement dial indicator for a specific application, always verify the configuration of the indicator. Ordering a replacement using the standard model number shown on your indicator may not provide you with the configuration or accessories you desire.

Selecting the right ANSI/AGD type

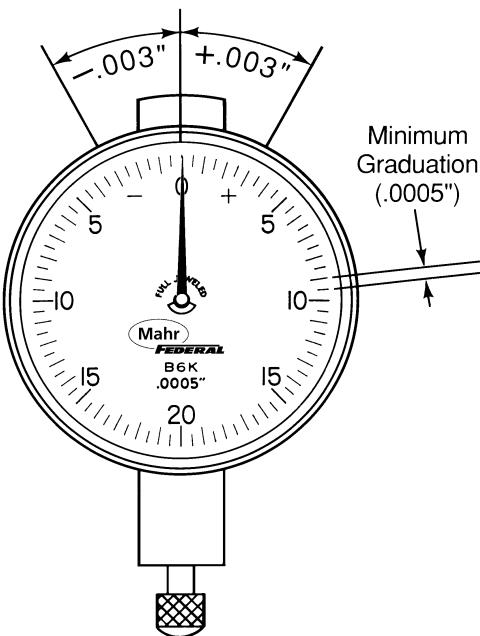
Since modern manufacturing involves a wide range of tolerances, choosing a dial indicator might be difficult, especially since the number of indicators available is so vast. The following guidelines were prepared to assist you in selecting the right model for your application.

Consider four characteristics when selecting a dial indicator:

- **Minimum Graduation Value** – value of the smallest graduations marked on the dial. From several different values available from Mahr Federal, select the one which is closest to 10% of the tolerance spread of the work you are measuring. This assures that the tolerance will span about ten divisions of the dial
- **Size** – represents the bezel diameter. Make your selection on the basis of space available for the indicator and the distance from which it will be viewed. The Indicator photograph shown on the first page of each ANSI/AGD Group is full scale. Simply place the page which illustrates the Indicator at the expected viewing distance, and choose the size that offers you the best readability and is the proper size for your fixture. Mahr Federal's "C" size bezels (ANSI/AGD Group 2), which have a diameter of 2-1/4in, are the most popular.
- **Range per Revolution** – represents the distance the spindle travels with one complete revolution of the dial hand. From the dials available in the size and minimum graduation value you chose, select the range per revolution which allows the tolerance spread to occupy 1/10 to 1/4 of the dial.
- **Total Range** – the maximum distance over which the indicator spindle can travel. Usually, this represents 2-1/2 revolutions of the hand, which is adequate for most needs. Sometimes, however, this may not be adequate for your application and a special total range may be necessary.

If your tolerance spread is .006in ($\pm .003\text{in}$), then, the most suitable minimum graduation value is .0005in.

TOLERANCE IS .006"



Your tolerance spread is .006in. You have chosen an ANSI/AGD Group 2 (Mahr Federal "C" Size) dial with a minimum graduation value of .0005in. Mahr Federal offers four indicator types in this size and minimum graduation value. Of these, type C5M has a range per revolution of .030in which is about midway between your tolerance extremes.

You selected a C5M indicator. Your total range, however, needs to be at least .200in so the spindle can clear the lip of your part. But, the longest range available in the C5M indicator you need is only .075in. Special ranges up to .400in are available for this indicator type. Select the closest range for your application (for Model C5M, you would select .250in). If the range you need is not listed under the "Special Ranges" category, contact Mahr Federal. Chances are we can supply the range you need.

Copies of the current ANSI Standard for Dial Indicators (ANSI B89.1.1 0-1987) are available from:

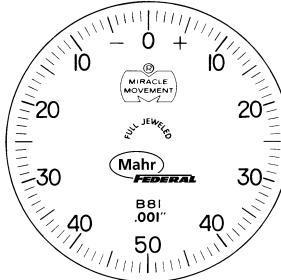
The American Society of Mechanical Engineers
ASME Order Desk
22 Law Drive
Fairfield, NJ 07007
(973)882-1167

ANSI/AGD Dial options

- 1. Balanced (+) on right.** Normally furnished on all Group 0, 1, 3 and 4 ANSI/AGD indicators only, unless otherwise specified*. Indicates an increasing value when contact is depressed as in comparison type O.D. snap and bench thickness gages.

Note: If Revolution Counter models are ordered, counter dial operates counterclockwise.

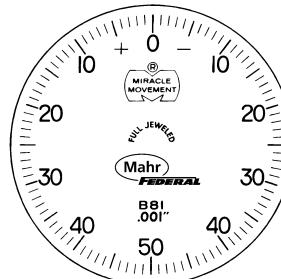
* Group 2 Indicators are normally furnished with continuous dial, revolution counter and tolerance hands.



- 2. Balanced (+) on left.** Indicates decreasing values when contact is depressed as in comparison bore* and depth gages.

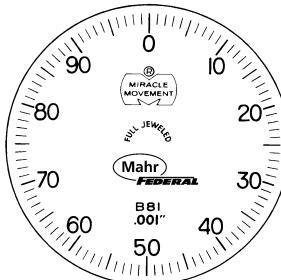
* Will vary as dictated by motion transfer design.

Note: With Revolution Counter models, counter dial operates clockwise.



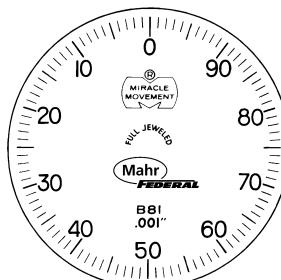
- 3. Continuous clockwise.** Normally furnished on Long and Extra Long Range Indicators, unless otherwise specified. Indicates an increasing value when contact is depressed as in direct-reading thickness gages.

Note: With Revolution Counter models, counter dial operates counterclockwise.



- 4. Continuous counterclockwise.** Indicates a decreasing value when contact is depressed as in direct reading slot, recess or hole depth measurements.

Note: If Revolution Counter models are ordered, counter dial operates clockwise



ANSI Group 0 – Mahr Federal Series A and N

- Where available space prohibits the use of a larger dial indicator.



**Miniature
ANSI Group 0
Federal Series A & N**

Technical Data

Mahr Federal Series A (inch)

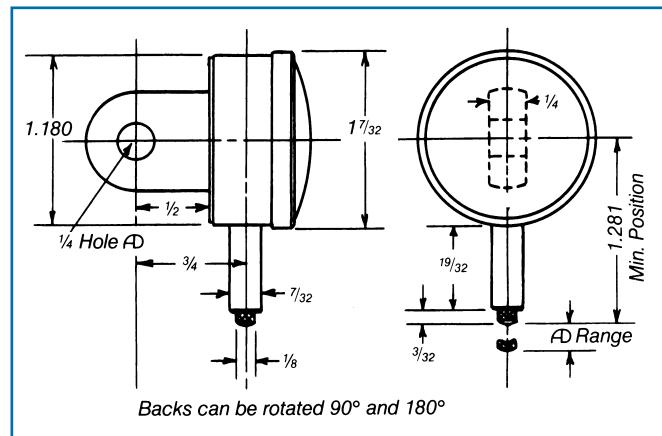
Dial: approx. 1.250in dia. with soft-green tint

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Order number
.010	.0001	0-2-0	.004	±.0001in	A-1/2-Q
.025	.0001	0-5-0	.010	±.0001in	A2I
.050	.0005	0-10-0	.020	±.0005in	A3Q
.100	.001	0-20-0	.040	±.001in	A6Q

Mahr Federal Series N (Metric – mm)

Dial: approx. 32mm dia. with soft-yellow tint

0.250	0.002	0-5-0	0.100	±0.002mm	N-1/2-O
1.250	0.005	0-25-0	0.500	±0.005mm	N3I
2.500	0.010	0-50-0	1.00	±0.010mm	N6I

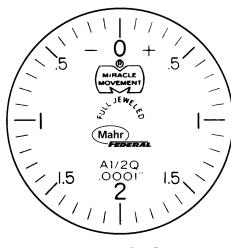


Dial Indicators



Dial Styles for ANSI Group 0

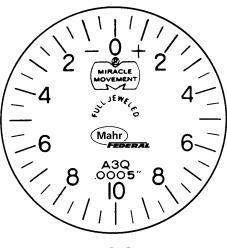
Mahr Federal Series A



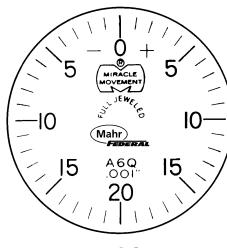
A-1/2-Q



A2I



A3Q



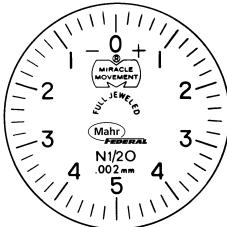
A6Q

- Normally furnished: balanced dial with + on right; centered vertical lug back; regular contact point, .09in radiused, .093in long.

- Optional dials: balanced with + on left; continuous clockwise; continuous counter-clockwise. Order by part number and specify dial style desired.)

- For other dial styles or special requirements, call Mahr Federal Customer Resource Center.

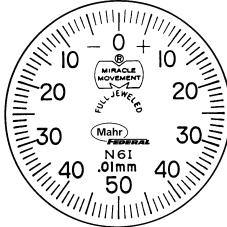
Mahr Federal Series N



N-1/2-O



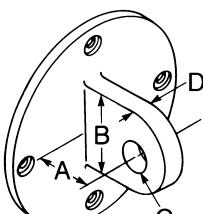
N3I



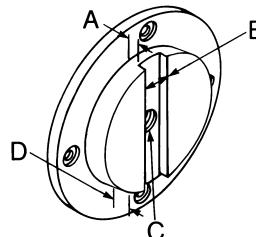
N6I

Backs for ANSI Group 0

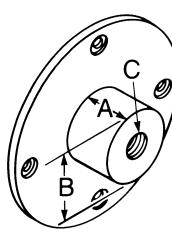
Vertical (Centered) Lug Back is normally furnished and included in price of Indicator. Back can be rotated 90° for horizontal lug mounting.



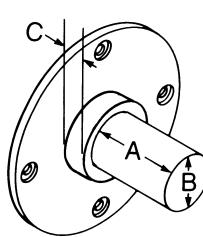
Vertical Lug
(Centered)
BK-37



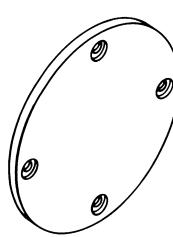
Adjustable
BK-45



Screw Type
BK-88



Post
BK-38



Flat
BK-32

A B C D
1/2in 11/16in 1/4in 1/4in

A B C D
1/8in 3/8in 8-32 1/4in

A B C
1/2in 11/16in 1/4-28

A B C
5/16in 7/32in 1/16in

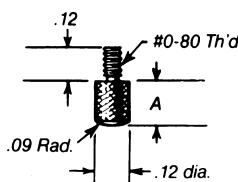
Split Bushing, BU-112

Fits Stem (.218in I.D. x .375in O.D.), .500in long.



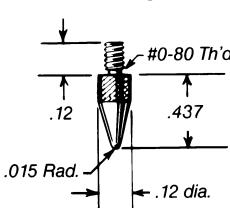
Points for ANSI Group 0

Regular
PT-43
normally
furnished

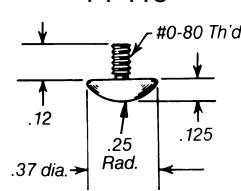


Dim. A	Style
3/32in	PT-43
1/4in	PT-204
3/8in	PT-205
1/2in	PT-207
5/8in	PT-208
3/4in	PT-209
7/8in	PT-210
1in	PT-211

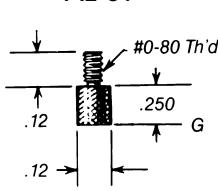
Taper
PT-119



Button
PT-118



Flat
AL-61



ANSI/AGD Group 1 – Mahr Federal Series B and O

- Best suited for multiple unit fixtures or smaller gages.

Technical Data



**ANSI/AGD Group 1
Mahr Federal Series B & O**

Mahr Federal Series B (Inch)

Dial: approx. 1.750in dia. with soft-green tint

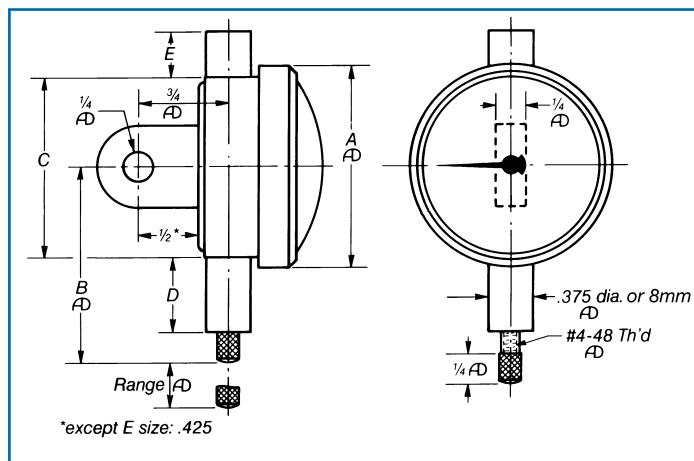
Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Order number
.025	.0001	0-5-0	.010	±.0001	12I
.025	.00025	0-5-0	.010	±.00025	12Q
.050	.00025	0-10-0	.020	±.00025	B3K
.050	.0005	0-10-0	.020	±.0005	B3Q
.075	.0005	0-15-0	.030	±.0005	B5M
.100	.0005	0-20-0	.040	±.0005	B6K
.125	.0005	0-25-0	.050	±.0005	B7I
.050	.001	0-10-0	.020	±.001	B3W
.100	.001	0-20-0	.040	±.001	B6Q
.125	.001	0-25-0	.050	±.001	B7O
.250	.001	0-50-0	.100	±.001	B8I

Mahr Federal Series O (Metric, mm)

Dial: approx. 45mm dia. with yellow tint

0.500	0.002	0-10-0	0.200	±0.004	O1I
1.250	0.005	0-25-0	0.500	±0.005	O3I
2.500	0.010	0-50-0	1.000	±0.010	O6I
6.250	0.025	0-125-0	2.500	±0.025	O8I

Dimensions



ANSI/AGD Group	Mahr Federal Styles	A	B	C	D	E
1	B/O	42.86mm/ 1.688in	41.28mm/ 1.625in	38.10mm/ 1.5in	15.88mm/ .625in	8.73mm/ .344in
2	C/P	57.15mm/ 2.25in	50.80mm/ 2in	52.39mm/ 2.063in	18.26mm/ .719in	8.73mm/ .344in

Dial Indicators



ANSI/AGD Group 2 — Mahr Federal Series C and P

- Most widely used for all dial indicator applications.

Technical Data

Mahr Federal Series C (Inch)

Dial: approx. 2.250in dia. with soft-green tint

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Model number	Order number
.020	.0001	0-4-0	.008	±.0001	C1K	C1K
.025	.0001	0-5-0	.010	±.0001	22IN	2014761
.025	.00025	0-5-0	.010	±.00025	22QN	2014791
.050	.00025	0-10-0	.020	±.00025	23K	2014808
.050	.0005	0-10-0	.020	±.0005	23Q	2017810
.075	.0005	0-15-0	.030	±.0005	25M	2014811
.100	.0005	0-20-0	.040	±.0005	26K	2014812
.125	.0005	0-25-0	.050	±.0005	27I	2014814
.050	.001	0-10-0	.020	±.001	23W	2014809
.100	.001	0-20-0	.040	±.001	26Q	2014813
.125	.001	0-25-0	.050	±.001	27O	2014815
.250	.001	0-50-0	.100	±.001	28IN	2011049

Super Sensitive Type (Inch)

.010	.00005	0-2-0	.004	±.0001	C-1/2-K	C-1/2-K
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Mahr Federal Series P (Metric – mm)

Dial: approx. 57mm dia. with soft-yellow tint

0.500	0.002	0-10-0	0.200	±0.002	21IN	2014773
1.250	0.005	0-25-0	0.500	±0.005	23I	2014817
2.500	0.010	0-50-0	1.000	±0.010	26I	2014818
5.000	0.020	0-100-0	2.000	±0.020	28IM	2014819

Super Sensitive Type (Metric – mm)

0.250	0.001	0-5-0	0.100	±0.002	P-1/2-I	P-1/2-I
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These indicators are normally furnished with continuous dial, lug back, revolution counter and tolerance hands except for: C1K, C 1/2 K & P 1/2 I



ANSI/AGD Group 2
Mahr Federal Series C & P

- **Contact Points** - see pages 4-64 and 4-65
- **Backs and Mounting Brackets** - see pages 4-28 and 4-29
- **Accessories** - see pages 4-30 and 4-31

Ordering Information

In addition to the information provided above, see page 4-11 for complete instructions on ordering your dial indicators and accessories.

www.mahr-federal.com

ANSI/AGD Group 3 – Mahr Federal Series D and Q

Recommended for larger gages and greater visibility.



**ANSI/AGD Group 3
Mahr Federal Series D & Q**

Technical Data

Mahr Federal Series D (Inch)

Dial: approx. 2.750in dia. with soft-green tint

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Order number
.020	.0001	0-4-0	.008	±.0001	D1K
.025	.0001	0-5-0	.010	±.0001	32I
.025	.00025	0-5-0	.010	±.00025	32Q
.050	.00025	0-10-0	.020	±.00025	D3K
.075	.00025	0-15-0	.030	±.00025	D5G
.050	.0005	0-10-0	.020	±.0005	D3Q
.075	.0005	0-15-0	.030	±.0005	D5M
.100	.0005	0-20-0	.040	±.0005	D6K
.125	.0005	0-25-0	.050	±.0005	D7I
.050	.001	0-10-0	.020	±.001	D3W
.100	.001	0-20-0	.040	±.001	D6Q
.125	.001	0-25-0	.050	±.001	D7O
.250	.001	0-50-0	.100	±.001	D8I

Mahr Federal Series Q (Metric – mm)

Dial: approx. 70mm dia. with soft-yellow tint

0.500	0.002	0-10-0	0.200	±0.002	Q1I
1.250	0.005	0-25-0	0.500	±0.005	Q3I
2.500	0.010	0-50-0	1.000	±0.020	Q6I
5.000	0.020	0-100-0	2.000	±0.020	Q8I

- **Contact Points** - see pages 4-64 and 4-65
- **Backs and Mounting Brackets** - see pages 4-28 and 4-29
- **Accessories** - see pages 4-30 and 4-31

Ordering Information

In addition to the information provided above, see page 4-11 for complete instructions on ordering your dial indicators and accessories.

www.mahr-federal.com

Dial Indicators



ANSI/AGD Group 4 — Mahr Federal Series E and R

When distance or reduced lighting requires a larger size for improved visibility.



ANSI/AGD Group 4
Mahr Federal Series E & R

Technical Data

Mahr Federal Series E (Inch)

Dial: approx. 3.625in dia. with soft-green tint

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Order number
.020	.0001	0-4-0	.008	$\pm .0001$	E1K
.025	.0001	0-5-0	.010	$\pm .0001$	42I
.050	.00025	0-10-0	.020	$\pm .00025$	E3K
.075	.00025	0-15-0	.030	$\pm .00025$	E5G
.050	.0005	0-10-0	.020	$\pm .0005$	E3Q
.075	.0005	0-15-0	.030	$\pm .0005$	E5M
.125	.0005	0-25-0	.050	$\pm .0005$	E7I
.050	.001	0-10-0	.020	$\pm .001$	E3W
.125	.001	0-25-0	.050	$\pm .001$	E7O
.250	.001	0-50-0	.100	$\pm .001$	E8I

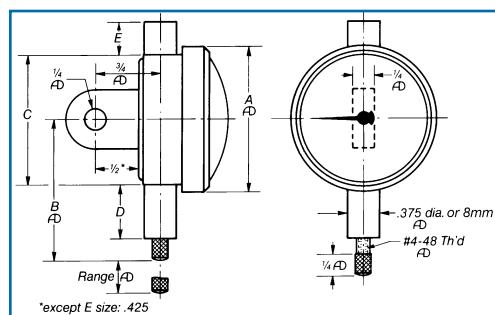
Mahr Federal Series R (Metric – mm)

Dial: approx. 92mm dia. with soft-yellow tint

0.500	0.002	0-10-0	0.200	± 0.002	R1I
1.250	0.005	0-25-0	0.500	± 0.005	R3I
2.500	0.010	0-50-0	1.000	± 0.010	R6I
5.000	0.020	0-100-0	2.000	± 0.020	R8I

Dimensions

ANSI/AGD Group	Mahr Federal Styles	A	B	C	D	E
3	D/Q	69.85mm/ 2.75in	53.98mm/ 2.125in	65.09mm/ 2.563in	15.88mm/ .625in	8.73mm/ .344in
4	E/R	92.08mm/ 3.625in	65.09mm/ 2.563in	87.31mm/ 3.438in	15.88mm/ .625in	8.73mm/ .344in



Easy Reading, Single Revolution Dial Indicator

... assure correct readings every time.

A practical solution for inspectors and machine operators who need to eliminate the potential for indicator misreadings. No matter how far out of tolerance a part may be, the needle of a one revolution indicator will always stay in the red, non-read zone — no passing zero again — no reading errors.

- No limited contact travel
- Shockproof "Following Movement" always keeps the hand within a single revolution.
- Alternate contact points, backs and other accessories are optionally available.
- Metric dials are yellow
- One-piece case design
- Inserted precision bearings
- Available in ANSI/AGD Group 2 size



Technical Data

Measuring Range	Graduation value	Stem diameter	Model number	Order number
2mm	0.02mm	.375in	P1RN-200	2014794
1mm	0.01mm	.375in	P1RN-100	2014795
2mm	0.02mm	8mm	M1RN-200	2014796
1mm	0.01mm	8mm	M1RN-100	2014797
.080in	.001in	.375in	C1RN-80	2014792
.040in	.0005in	.375in	C1RN-40	2014793

Economy Dial Indicators

New, low cost, rugged indicators with the accuracy and reliability you expect from Mahr Federal.

- .375in Mounting stem
- 4-48 Contact Threads
- Accuracy meets or exceeds ANSI Specifications
- Lugback included
- High precision movement

Technical Data

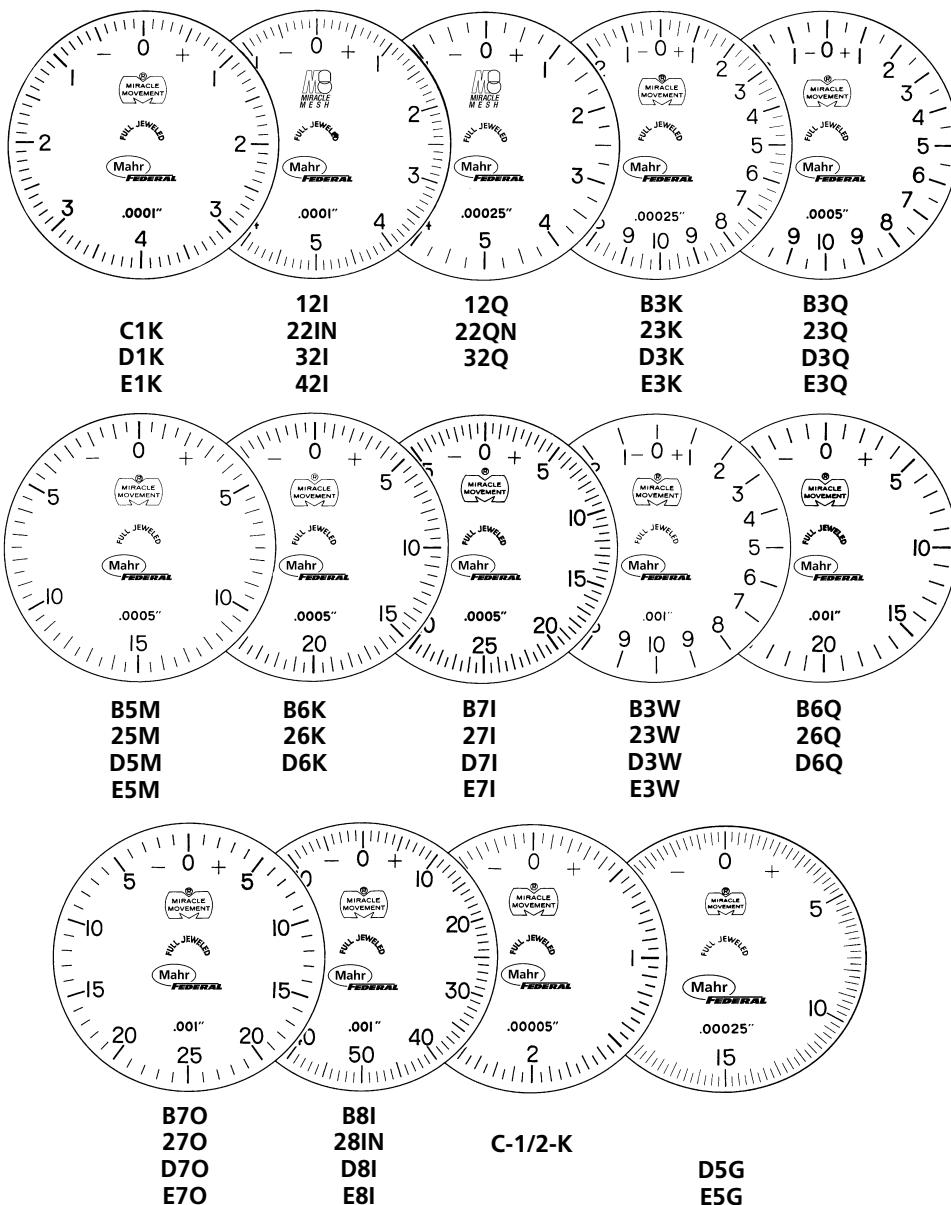
Item	Measuring Range	Graduation value	Dial Style	Order number
1810 SZ	.25in	.001in	0-50-0	4319931
1810 SZ	.25in	.001in	0-100	4319930
1810 HZ	.25in	.001in	0-50-0	4319921
1810 HZ	.25in	.001in	0-100	4319920
1810 VZ	.25in	.001in	0-50-0	4319901
1810 VZ	.25in	.001in	0-100	4319900
1810 MZ	.25in	.0005in	0-25-0	4319911
1810 MZ	.25in	.0005in	0-50	4319910



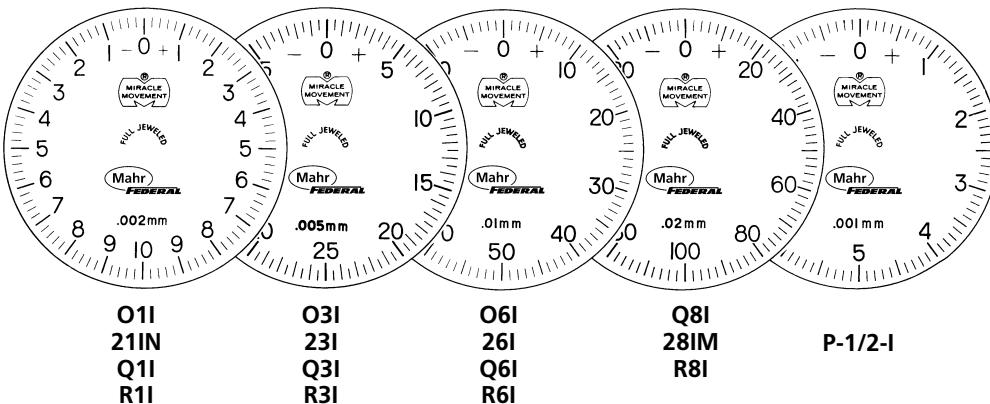
Dial Indicators

Dial Styles for ANSI/AGD Groups 1 thru 4

Mahr Federal Series A thru E



Mahr Federal Series O thru R



Indicator O8I is not illustrated: Dial style is 0-125-0, minimum graduation is .025mm

- Normally furnished: dial as illustrated; centered vertical lug back; regular contact point, .18in radiused, 1/4in long.

- Optional Dials: balanced dial with + on left; continuous clockwise; continuous counter-clockwise. (Order by part number and specify dial style desired.)

- Revolution Counters available, please specify when ordering. Includes continuous dial unless otherwise specified.

- For other dial styles or special requirements - call Mahr Federal Customer Resource Center.

- Indicator dimensions are located on pages containing individual ANSI/AGD descriptions.

- **Contact Points** - see pages 4-64 and 4-65

- **Backs and Mounting Brackets** - see pages 4-28 and 4-29

- **Accessories** - see pages 4-30 and 4-31

Ordering Information

In addition to the information provided above, see page 4-11 for complete instructions on ordering your dial indicators and accessories.

www.mahr-federal.com

Long Range and Extra Long Range Indicators

For applications where extended measuring range is needed or spindle retraction is necessary.

D8IS
Long Range Indicator



Technical Data

Long Range/Extra Long Range (Inch)

Dial: soft-green tint

Long Range

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	ANSI/AGD Group	Model number	Order number
.500	.001	0-100	.100	.001	2	28IQN	2014699
.500	.0001	0-10	.010	.0001*	4	42IQ	42IQ
1.000	.001	0-100	.100	.001	2	28ISN	2014698
1.000	.001	0-100	.100	.001	3	D8IS	D8IS
1.000	.010	0-100	1.000	.010	2	29I	2014816

Extra Long Range

2.000	.001	0-100	.100	.001**	3	D8IT
3.000	.001	0-100	.100	.001**	4	E8IU

*for first 2-1/2 revolutions only.

**for first 1 inch of travel.

Long Range/Extra Long Range (Metric)

Dial: yellow tint

Long Range

25.000	0.010	0-100	1.000	.020	2	SP6IS
25.000	0.010	0-100	1.000	.020	3	SQ6IS

Extra Long Range

50.000	0.025	0-25	2.500	.025***	3	Q8IT
75.000	0.025	0-25	2.500	.025***	4	R8IU

***for first 25mm of travel.

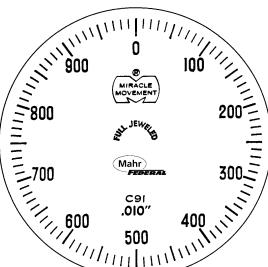
Dial Indicators



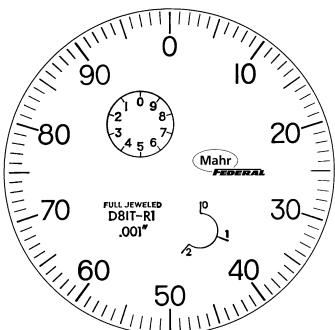
Dial Styles for Long Range and Extra Long Range Indicators



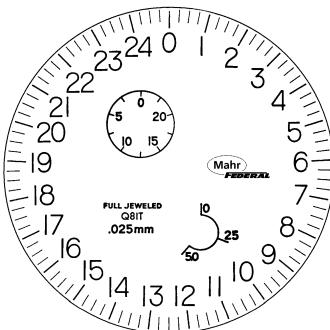
28IQN, 28ISN & D8IS



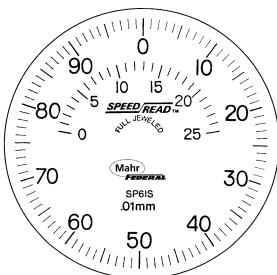
29I



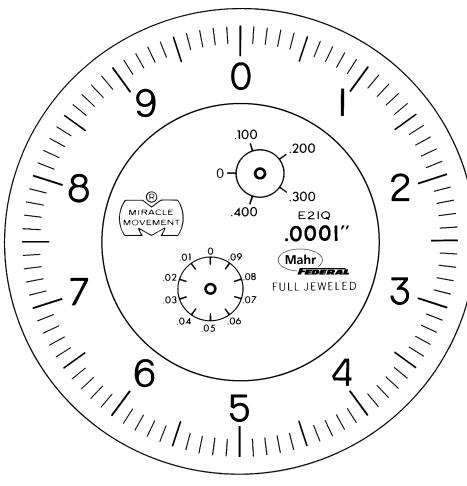
D8IT & E8IU



Q8IT & R8IU



SP6IS & SQ6IS



42IQ

- Normally furnished: continuous clockwise dial; centered vertical lug back; regular contact point, .18in radiused, .250in long.
- Long Range Models: include (1) revolution counter (except C9I without revolution counter). Extra Long Range Models: include (2) revolution counters.
- For other dial styles or special requirements - call Mahr Federal Technical Assistance.
- Indicator dimensions are located on pages containing individual ANSI/AGD descriptions.

- **Contact Points** - see pages 4-64 and 4-65
- **Backs and Mounting Brackets** - see pages 4-28 and 4-29
- **Accessories** - see pages 4-30 and 4-31

Ordering Information

In addition to the information provided above, see page 4-11 for complete instructions on ordering your dial indicators and accessories.

www.mahr-federal.com

Dial Indicator Modifications & Specials

Available to meet specific requirements.

- **Special Ranges**
- **Restricted Hand Travel**
- **Special Dials**
- **High Temperature**
- **Special Contact Points**
- **8mm Stem Diameters**
Special Lengths
- **Specified Contact Load**
- **Counter-clockwise Movement**
- **Special Stem Lengths**
- **Push-Down Action**
- **Special Ratio Movement**
- **Threaded Stems**

Series WC and WP Wetproof Dial Indicators

Splashproof protection from coolant, oil, or other contaminants.

Technical Data

Series WC and WP Wetproof Dial Indicators (Inch)

Dial: approx. 2-1/4in dia. with soft-green tint

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Order number
.025	.0001	0-10	.010	.0001	W22I
.050	.00025	0-20	.020	.00025	WC3K
.050	.0005	0-20	.020	.0005	WC3Q
.075	.0005	0-30	.030	.0005	WC5M
.100	.0005	0-40	.040	.0005	WC6K
.125	.0005	10-50	.050	.0005	WC7I
.250	.001	10-100	.100	.001	WC8I
1.000	.001	10-100	.100	.001	WC8IS

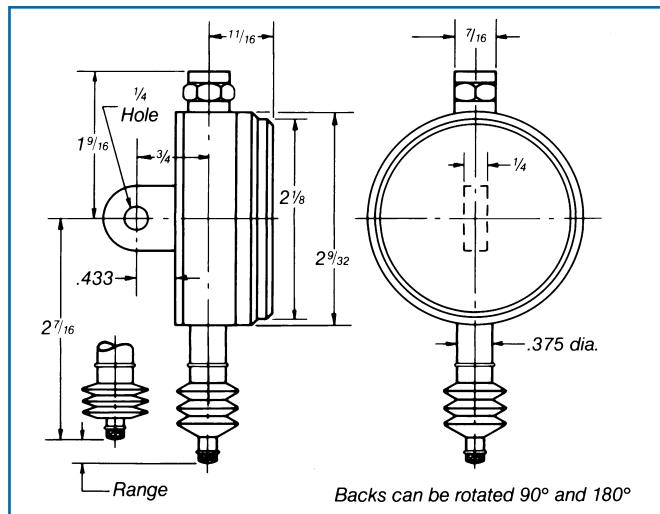
Series WC and WP Wetproof Dial Indicators (Metric)

Dial: approx. 57mm dia. with yellow tint

0.500	0.002	0-20	0.002	0.002	WP1I
1.250	0.005	0-50	0.500	0.005	WP3I
2.500	0.010	0-100	1.000	0.010	WP6I



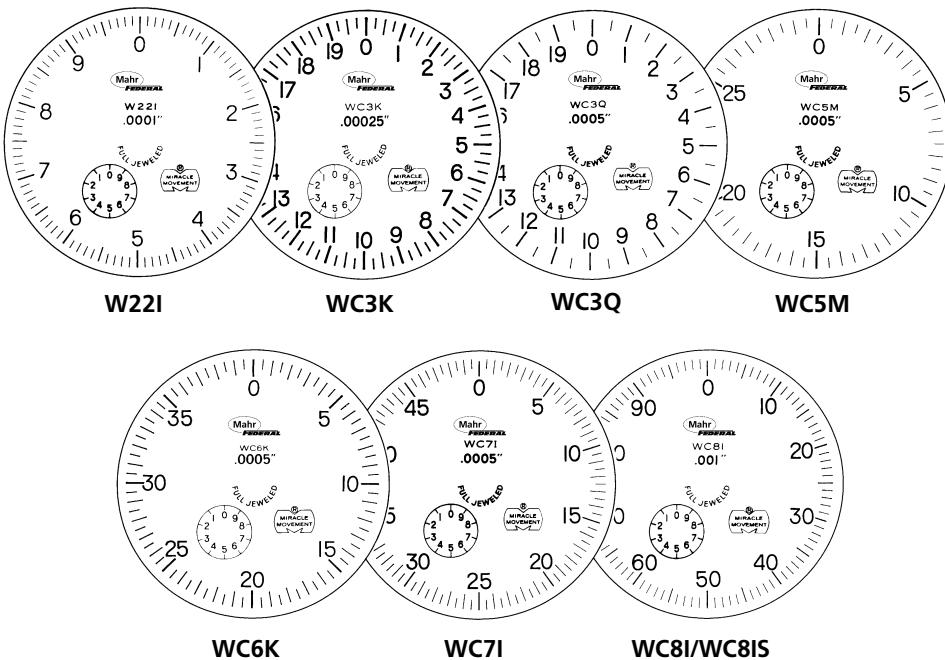
Wetproof
Dial Indicator



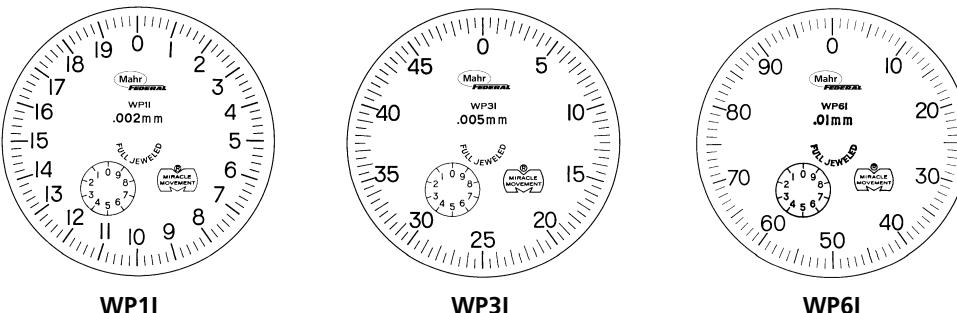
Dial Indicators

Dial Styles for WC and WP Wetproof Dial Indicators

Series WC indicators



Series WP indicators



- Normally furnished: continuous clockwise dial with revolution counter; BK-63 centered vertical lug back; regular contact point, .18in radiused, .625in long

- Optional Dials: continuous counter-clockwise with revolution counter; balanced outer dial with + on right or left. Order by dial type and specify dial style desired.

- For other dial styles or special requirements - call Mahr Federal Customer Resource Center.

- **Contact Points** - see pages 4-64 and 4-65

- **Backs and Mounting Brackets** - see pages 4-28 and 4-29

- **Accessories** - see pages 4-30 and 4-31

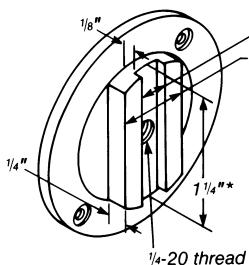
Ordering Information

In addition to the information provided above, see page 4-11 for complete instructions on ordering your dial indicators and accessories.

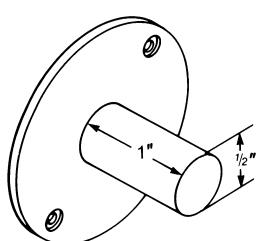
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Backs for Wetproof Dial Indicators

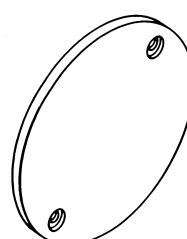
Vertical (centered) lug back is normally furnished and included in price of indicator. Back can be rotated 90° for horizontal lug mounting.



BK-68
Adjustable
Back



BK-90
Post
Back



BK-97
Flat
Back

Perpendicular Dial Indicators

Provides improved readability where other style indicators cannot be used.

Technical Data

Series F, G, J, V (Inch)

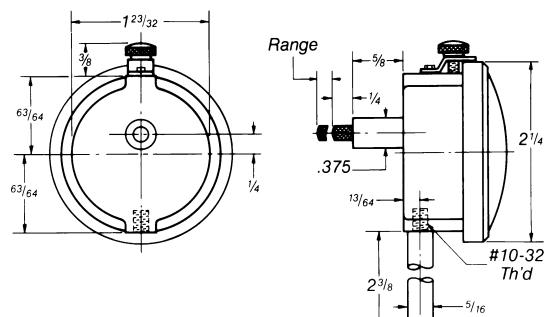
Dial: soft-green tint

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Gear type	Dial Dia. (approx.)	Order number
.008	.0001	0-4-0	.008	.0001	crown	2-1/4	J1K
.040	.0005	0-20-0	.040	.0005	crown	2-1/4	J6K
.100	.0005	0-12-0	.025	.0005	spiral	2-1/4	G4O
.100	.001	0-50-0	.100	.001	crown	2-1/4	J8I
.100	.001	0-50-0	.100	.001	crown	1-11/16	V8I
.200	.001	0-50-0	.100	.001	spiral	1-23/32	F8I
.200	.001	0-50-0	.100	.001	spiral	2-1/4	G8I

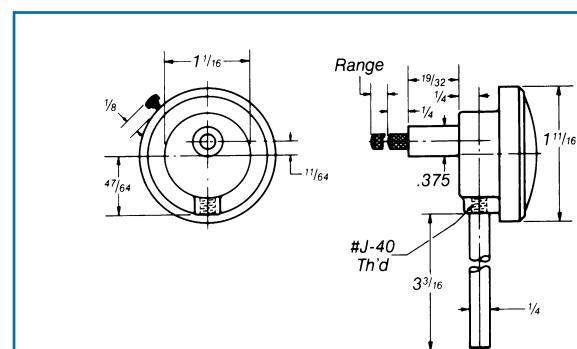
Series I, W (Metric)

Dial: yellow tint

0.002	0.002	0-10-0	0.002	0.002	crown	57	W1I
1.000	0.010	0-50-0	1.000	0.010	crown	57	W8I
2.500	0.025	0-125-0	2.500	0.025	crown	57	W8I
2.500	0.025	0-125-0	2.500	0.025	crown	43	I8I



J & W Models



V & I Models

Dial Indicators



Dial Styles for Perpendicular Indicators

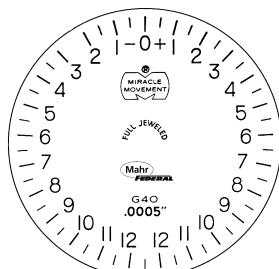
Series J, G, V, F



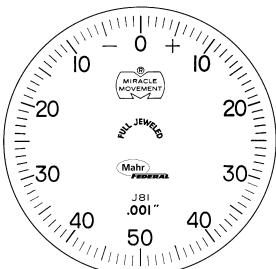
J1K



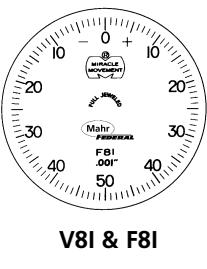
J6K



G4O

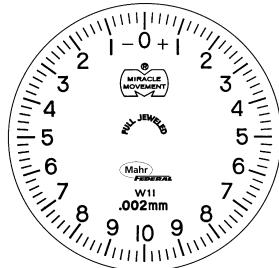


J8I & G8I

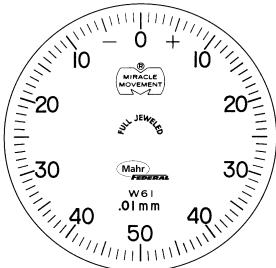


V8I & F8I

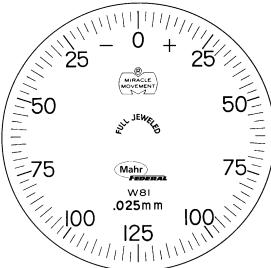
Series W, I



W1I



W6I



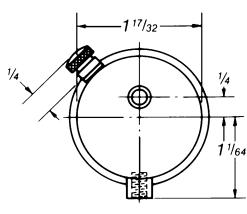
W8I & I8I

- Normally furnished: balanced dial with + on right; mounting rod (see dimension drawings); regular contact point, .18in radiused, .250in long.
- Threaded stem versions available as an option; AD-59 (.562in long x .500in O.D. for "J & W" styles), 3/8-32 internally threaded bushings and AD-60 (.687in long x .500in O.D. for "G & F" Models) purchased separately. Bushings also available separately.
- For other dial styles or special requirements - call Mahr Federal Customer Resource Center.
- **Contact Points** - see pages 4-64 and 4-65.
- **Backs and Mounting Brackets** - see pages 4-28 and 4-29
- **Accessories** - see pages 4-30 and 4-31

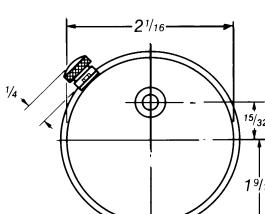
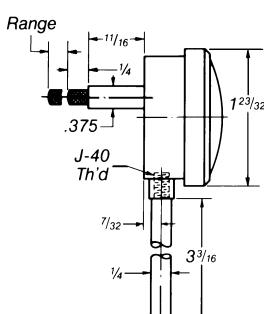
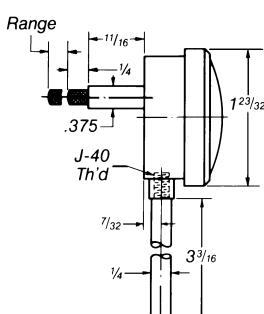
Ordering Information

In addition to the information provided above, see page 4-11 for complete instructions on ordering your dial indicators and accessories.

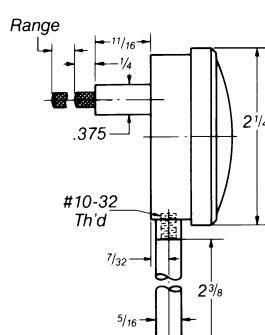
www.mahr-federal.com



F8I Model



G Models

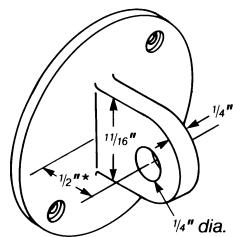


Backs for ANSI/AGD dial indicators

- Backs shown are for ANSI/AGD Groups 1,2,3,4, Long Range and Extra Long Range Indicators.
- Backs for ANSI/AGD Group 0 Indicators - see page 4-15.
- Backs for Wetproof Indicators - see page 4-25.

- To order - specify Back Order Number (from table).
- Backs for ANSI/AGD Group 1 (Series B/O) Indicators can be repositioned 180°.
- Backs for ANSI/AGD Group 4 (Series E/R) Indicators can be repositioned 90° and 180°.
- For Special Backs - call Mahr Federal Customer Resource Center.

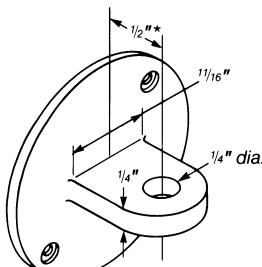
Vertical Lug



* $\frac{27}{64}$ " for E/R size

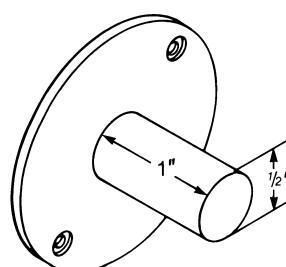
(centered)
normally furnished

Horizontal Lug

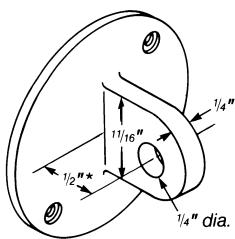


(centered)

Post

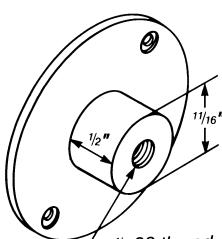


Vertical Lug

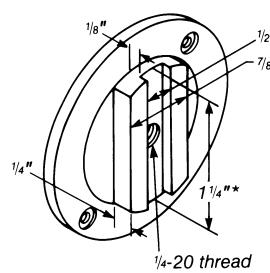


(offset) Left face of lug is
on centerline of back

Screw Type

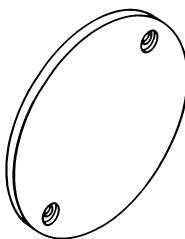


Adjustable



* $\frac{7}{8}$ " for B/O size; no flats

Flat



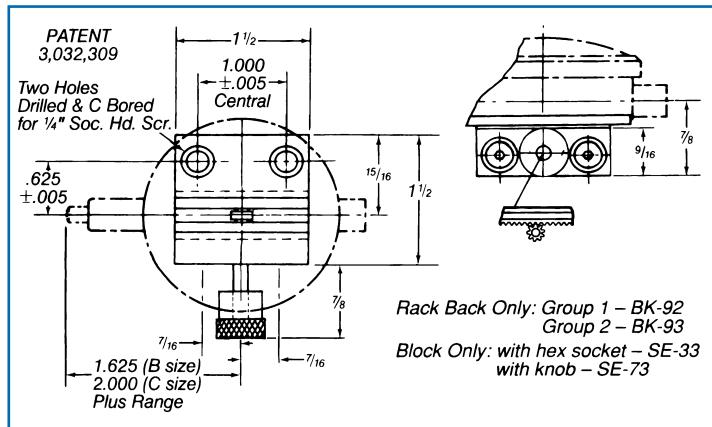
ANSI/AGD

	Group 1 Series B/O	Group 2 Series C/P	Group 3 Series D/Q	Group 4 Series E/R
Vertical Lug, Centered	BK-1600	BK-383	BK-431	BK-3
Vertical Lug, Offset	BK-1601	BK-2168	BK-545	BK-4
Horizontal Lug, Centered	BK-19	BK-400	BK-109	BK-3
Flat	BK-1660	BK-470	BK-473	BK-5
Post	BK-1634	BK-2093	BK-664	BK-17
Screw	BK-1661	BK-692	BK-177	BK-16
Adjustable	BK-1633	BK-531	BK-10	BK-18

Adjustable Mounting Brackets

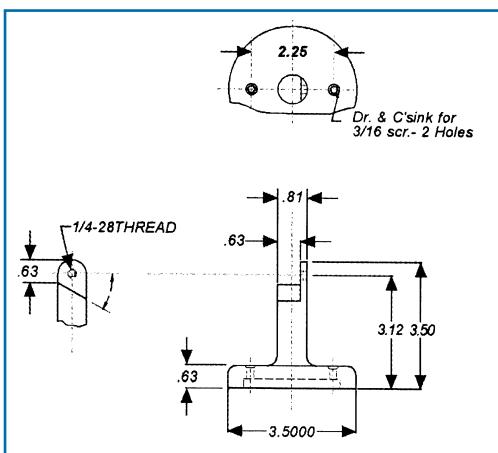
- Allows fast, positive indicator adjustments
- Ideal for permanent indicator mounting to fixtures
- Rack Back included with all Brackets
- Sizes for ANSI/AGD Groups 1 and 2

Order number	Used with	Mahr Federal Indicator
AT-27	hex socket adjust.	Group 1
AT-115	adjusting knob	Group 1
AT-28	hex socket adjust.	Group 2
AT-116	adjusting knob	Group 2



Universal Mounting Base

- Allows mounting indicator to custom fixtures
- Uses lug back to mount indicator
- Accommodates all size indicators



Order number: BA-1051

Dial Indicators

Indicator Accessories

Adapt Federal Dial Indicators to a wide range of applications.



Weights

Used with ANSI/AGD type and long range indicators. Applies constant pressure throughout indicator range.

To order specify requirement.



Protective Housing

For ANSI/AGD Group 2 indicators. Opens at rear so indicator can be mounted by its back. Mounts to indicator stem using a .687in O.D. bushing (not included). Order **HG-100** for Indicator models with ranges up to 6.35mm/.250in, **HG-101** for ranges of 6.35mm/.250in to 25mm/1in.

Recommended bushings: **BU-111** split bushing, or **AD-87** split collet. See next page.

Magnetic Maximum Hand

For ANSI/AGD Groups 2 and 3 indicators having plain dials. Accurately indicates maximum reading. Easy to reset. Order **2014804** (Group 2, snap-on bezel), **2011341** (Group 3, screw-on bezel).

Styles for Groups 1 and 4 indicators available on special order; consult Mahr Federal Customer Resource Center.



Range Limiting Caps

Used with ANSI/AGD type indicators. Adjustable thru 9.52mm/.375in to limit range to any desired amount. Order **CS-123**.



Lifting Levers - CAM Type

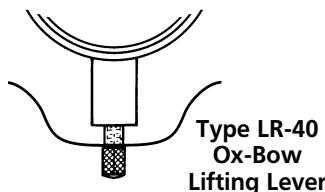
Used with ANSI/AGD type and long range indicators.



Order number

Left Hand	Right Hand	Use with Indicator Type
LR-46	LR-47	ANSI/AGD Group 1*
LR-48	LR-49	ANSI/AGD Group 2*
LR-50	LR-51	ANSI/AGD Group 3*
LR-68	LR-69	ANSI/AGD Group 4*
LR-115	LR-116	Federal Models D8IT & Q8IT
LR-40		Ox-Bow Lifting Lever

*Up to 25mm/1in range



Tolerance Hands

Used with ANSI/AGD, long range and some Perpendicular indicators. Furnished integrally with split bezel. Easily replaces regular bezel.



Order number

Snap-on Bezel	Screw-type Bezel	Use with Indicator Type
HD-128	HD-59	ANSI/AGD Group 1
BZ-2503	HD-57	ANSI/AGD Group 2
	HD-55	ANSI/AGD Group 3
	HD-53	ANSI/AGD Group 4



Electronic Probe Adapter

Permits using electronic probes with many Mahr Federal dial indicators. Order **AD-138**.



Dial Indicators



Indicator Accessories

Hole Attachments

For ANSI/AGD type and perpendicular indicators with .375in diameter stems. For measuring internal surfaces. Order **AT-7293**, 47.50mm/.187in long, **AT-7294**, 25mm/1in long.



Brake Attachment

For ANSI/AGD indicators with .001in graduations. Requires indicator modification for assembly. Range limited to 6.35mm/.250in for Group 1 indicators; and to 12mm/.500in for Group 2 indicators. Order **AT-A-7** stem mount, **AT-81**, dust cap mount.



Auxiliary Plungers

For extending reach of all ANSI/AGD type and perpendicular indicators with .375in diameter stems and ranges up to 6.35mm/.250in range. Attaches to indicator stem by integral split collet. Body is 12mm/.500in O.D. Order **AT-25**, 57mm/2.25in long, **AT-26**, 104mm/4in long. Special lengths available. Replacement contact, **PT-184**, 8-32 thread.



Split Bushings

Fits all ANSI/AGD type and perpendicular indicators. Permits safe, non-cramping stem mounting. Order **BU-80**, .375in stem hole x .500in O.D., **BU-111** for use with protective housings (.375in stem hole x .687in O.D.), **BU-112** (.218in stem hole x .375in O.D.), **BU-197** (8mm stem hole x .375in O.D.)



Split Collet

For .375in diameter stem indicators. Six-finger grip permits easy, secure indicator adjustment. Requires 1/2-32 threaded hole. O.D. is 17.45mm/.687in. Can be used with protective housings, page 29. Order **AD-87**. For 1/2-32 tap, order **V-892**.



Threaded Bushing

For ANSI/AGD indicators with 5/16-32 threaded stems (an available option from Mahr Federal). Permits conventional stem mounting of indicator in gages and fixtures. Order **AD-62**, .625in long, .500in O.D., 5/16-32 internal thread. Threaded bushings for perpendicular indicators, see page 24.



Dust Guard

For ANSI/AGD perpendicular indicators with .375in diameter stems. Recommended for ranges of 7.62mm/.300in or less. Oil resistant to protect spindle and bushing from dust, mist and contaminants. Order **GU-2**. For sealed indicators, see Wetproof models, pages 21 and 22.



Right Angle Attachments

For ANSI/AGD type and perpendicular indicators (.375in diameter stems). For making measurements at right angle to spindle movement. Order **A-9**, regular type with flat spring hinge; for ranges up to 3.05mm/.120in. Replacement spring: **SP-56**. Order **AT-24**, long range type with pivot-type bearing; for ranges up to 9.50mm/.375in.



Dial Indicators per DIN 878

- Protective and lifter cap mounted on upper end of measuring spindle.
 - One piece protective housing provides maximum protection against shock and damage.
 - Compensation lever provides constant measuring force over entire range.
 - Self-contained movement. Can be removed and replaced quickly and easily for repair or maintenance purposes.
 - Maximum sensitivity and accuracy ensured by precision gears, pinion and rack as well as by precision guide for measuring spindle.
 - Adjustable tolerance markers.
 - Easy to read high contrast dial.
 - Simple fine adjustment with convenient knurled bezel.
 - Shockproof movement on all dial indicators long-range model 810 V where the rack is not located directly on the measuring spindle, but on a sleeve which floats on the spindle. Shocks to the spindle, therefore, are not transmitted to the rack and mechanism. In the event of shocks, spring force lifts the sleeve allowing it to slowly follow the spindle, thus, reliably protecting the movement even against severe shock.
-

Dial Indicators shockproof version per DIN 878



803



803 W



1810/1810 L



810 W

Features

Small Dial Indicator 803 where available space is limited

- Floating spindle sleeve for shockproof operation
- Constant measuring force
- One-piece protective housing
- Lifting cap retracts measuring spindle
- Adjustable tolerance markers
- Plastic case normally furnished

Small Dial Indicator 803 W
waterproof and oilproof

- Design features identical to 803 with following exceptions:
- Hermetically sealed upper protective measuring spindle cap as well as bezel and transparent dial cover
- Measuring spindle sealed with rubber sleeve, preventing contamination from liquids and impurities
- Plastic case normally furnished

Dial Indicator 1810/1810 L
standard version

- Floating spindle sleeve for shockproof operation
- Constant measuring force
- One-piece protective housing
- Lifting cap retracts measuring spindle or cable release 951 (accessory)
- Adjustable tolerance markers
- Plastic case normally furnished

Dial Indicator 1810 L

Design features identical to 1810, but with tapped holes for mounting lugs 961 and 962 (accessories)

Dial Indicator 810 W
waterproof and oilproof

- Design features identical to 810, with following exceptions:
- Hermetically sealed upper protective measuring spindle cap as well as bezel and transparent dial cover
- Measuring spindle sealed with rubber sleeve, preventing contamination from liquids and other impurities
- Plastic case normally furnished

- Contact Points - see pages 4-66 and 4-67.
- Accessories - see page 4-42.

Technical Data

Style	Measuring range mm	Graduation value mm	Dial diameter mm	Range/revolution mm	Accuracy mm	Order number
803	3	0.01	35	0.5	0.010	4324110
803W	3	0.01	35	0.5	0.010	4326100
1810	10	0.01	50	0.1	0.015	4311200
1810L	10	0.01	50	0.1	0.015	4327200
810W	10	0.01	50	0.1	0.015	4315200

Ordering Information

In addition to the information provided above, see page 4-11 for complete instructions on ordering your dial indicators and accessories.

www.mahr-federal.com

Dial Indicators shockproof version per DIN 878



810 B



803 Z



810 AZ

Features

Dial Indicator 810 B with limited measuring range

- Design features identical to 810 with following exceptions:
- Limited measuring range (0.8mm) for error-free readings

- Large overtravel (10mm); for easier insertion of test items in measuring devices
- Plastic case normally furnished

Small Dial Indicator 803 Z inch version

- Design features identical to 803 with following exceptions:
- Standard accessories include Adapter Bushing 940 for adapting mounting shank 8h6mm to inch bore .375in
- Plastic case normally furnished

Dial Indicator 810 AZ inch version

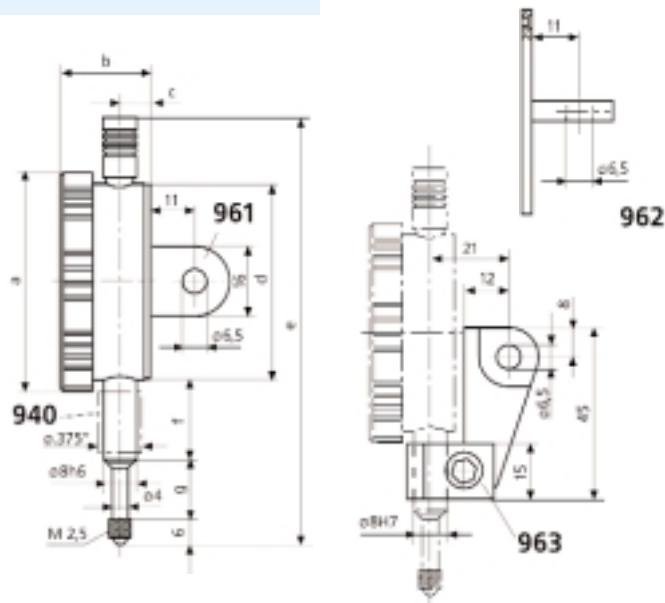
- Design features identical to 810, with following exceptions:
- Standard accessories: Adapter Bushing 940 for adapting mounting shank 8h6mm to inch bore .375in
- Plastic case normally furnished

Technical Data

	Style	Measuring range	Graduation value	Dial diameter	Range/revolution	Accuracy	Order number
mm	810B	.08(± 0.4)	0.01	50	0.8	0.007	4317110
inch	803Z	.120in	.0005in	1.4in	.2in	.0004in	4324911
	810AZ	.400in	.0005in	2in	.1in	.0006in	4311920

Dimensions

	mm	a	b	c	d	e	f	g
803	ø 40	21	7	ø 37	74	13.5	6	
803 W	ø 44	21.5	7	ø 37	80	15	11	
810	ø 58	23	7.5	ø 53	112	21	15.5	
810 L	ø 58	23	7.5	ø 53	112	21	15.5	
810 W	ø 60	24	7.5	ø 53	118	16.5	22.5	
810 B	ø 58	23	7.5	ø 53	112	21	15.5	
803 Z	ø 40	21	7	ø 37	74	13.5	6	
810 AZ	ø 58	23	7.5	ø 53	112	21	15.5	



Dial Indicators shockproof version per DIN 878



810 U



810 X



810 V

Features

Dial Indicator 810 U with reverse measuring force

Design features identical to 810, with following exceptions:

- Numerals on dial increase anti-clockwise (+ on left)
- Measuring force acting towards the top
- Plastic case normally furnished

Dial Indicator 810 X readings 0.1mm

Design features identical to 810, with following exceptions:

- 1 pointer movement on 10mm
- Plastic case normally furnished

Long-Range Dial Indicator 810 V with extra-large measuring range

Design features identical to 810, with following exceptions:

- 40mm range
- Strengthened measuring spindle (5mm)
- Measuring spindle retracted with a lifting cap
- Shockproof movement
- Plastic case normally furnished

Technical Data

Style	Measuring range mm	Graduation value mm	Dial diameter mm	Range/revolution mm	Accuracy mm	Order number
810 U	10	0.01	50	1.0	0.015	4329110
810 V	40	0.01	50	1.0	0.025	4321110
810 X	10	0.1	50	10.0	0.040	4331110
810 G	10	0.01	100	1.0	0.015	4322100

• Contact Points - see pages 4-66 and 4-67.

• Accessories - see page 4-42.

Ordering Information

In addition to the information provided above, see page 4-11 for complete instructions on ordering your dial indicators and accessories.

www.mahr-federal.com

Dial Indicators shockproof version per DIN 878



Features

Extra-Large Dial Indicator 810 G with dial dia. 100 mm

Design features identical to 810, with following exceptions:

- Engineered for long reading distance and bad light conditions
- Plastic outer ring
- Plastic case normally furnished

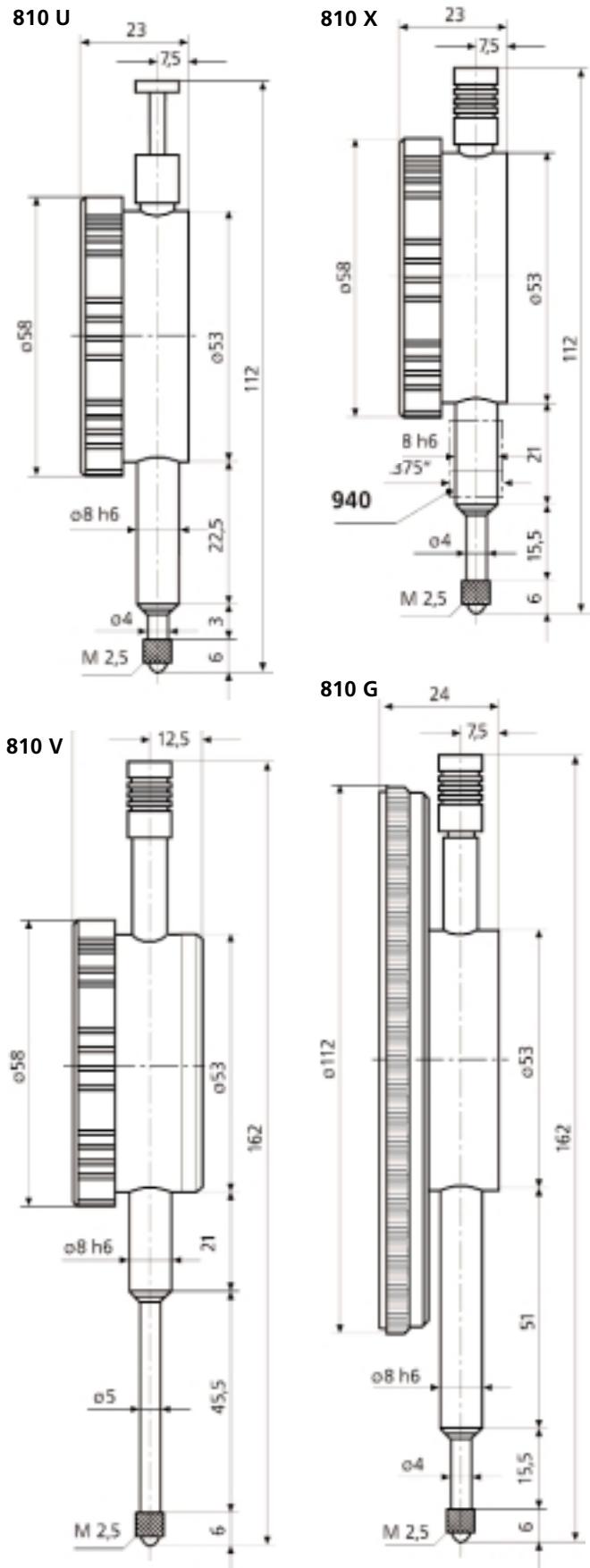
Order no. 4322100

- Contact Points
see pages 4-66 and 4-67
- Accessories
see page 4-42

Ordering Information

In addition to the information provided above, see page 4-11 for complete instructions on ordering your dial indicators and accessories.

www.mahr-federal.com



Dial Comparators



Dial Comparators — Design Features

- Built-in compression spring assures constant measuring force over entire range.



- Corrosion-proof, hardened, stainless steel mounting shank and measuring spindle.

- Sleeve seal ring offers ball guide protection against contaminants.

- Waterproof option available — features rubber bellows at measuring spindle, sealed screws and splash guard cover.

- High-precision ball guide construction for the measuring spindle prevents tilting and virtually eliminates friction and play assures high measurement accuracy and minimal hysteresis.

- Dial comparators with ball guide are particularly insensitive to lateral forces acting on the spindle (Dial Comparators 1010 and 1050 feature high-precision sleeve bearings for the spindle).

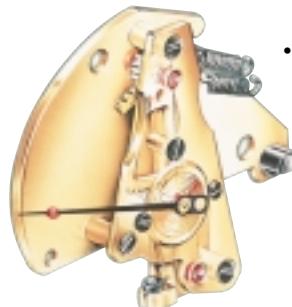
- Shockproof movement.

The precision ball of the first transmission lever rest on the lapped sapphire plane surface of the upper end of the measuring spindle. If the spindle is subject to severe impact, the plane surface is automatically raised, thus preventing transmission of the shock to the movement.

- One-piece housing encloses the movement and provides maximum protection against shock and damage.

- Lockable fine adjustment screw.

- Self-contained movement permits unit to be removed and replaced quickly and easily for repair or maintenance.



- Maximum sensitivity and accuracy are ensured by jewelled bearings of movement in conjunction with precision gears and pinions.



- Adjustable tolerance markers facilitate setting and observing tolerance limits.

- Measuring spindle retraction with either a screw-in cable or lifting knob.

- Fine-line scale for easy reading.

- Pointer moves over limited sector.

Mechanical Dial Comparators



1002



1003



1004



1010



1050

Technical Data

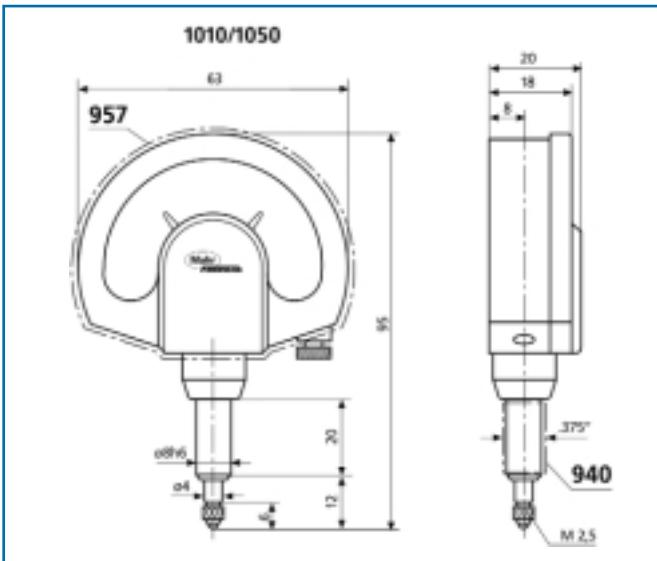
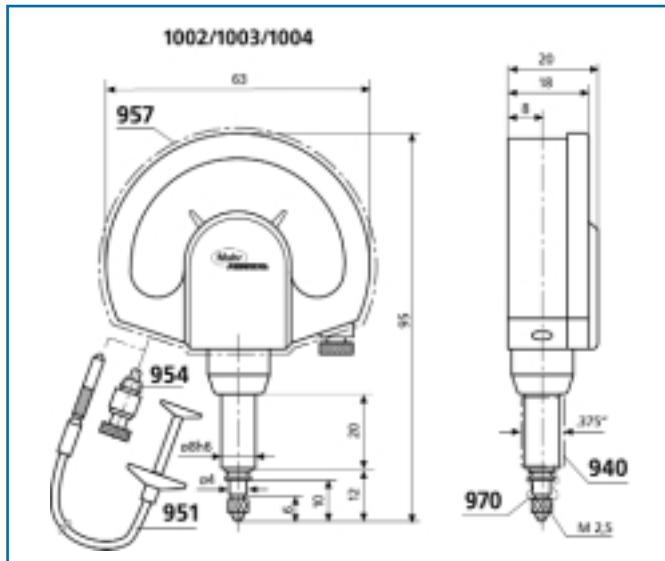
Style	Measuring range	Graduation value	Accuracy ¹	Order number	
				standard ²	wetproof ³
Metric					
1002	$\pm 25\mu\text{m}$	0.5 μm	0.5 μm	4335000	4335005
1003	$\pm 50\mu\text{m}$	1 μm	1 μm	4334000	4334005
1004	$\pm 0.13\text{mm}$	5 μm	3.5 μm	4333000	4333005
1010	$\pm 0.25\text{mm}$	0.01mm	7 μm	4332000	4332005
1050	$\pm 1.5\text{mm}$	0.05mm	35 μm	4330000	4330005
Inch					
1002 Z	$\pm .0010$	.00002	.00002	4335900	4335905
1003 Z	$\pm .0020$	.00005	.00005	4334900	4334905
1004 Z	$\pm .0050$	.0001	.0001	4333900	4333905
1010 Z	$\pm .0100$	.0005	.0005	4332900	4332905

¹ Accuracy of 1004, 1010, 1010 Z, 1050 better than DIN 879-1.

² Includes plastic case; Adaptor 940 (for Inch instruments only).

³ Includes plastic case, Splash Guard Cover 957, rubber bellows (only 1002/1003/1004); adaptor 940 (for Inch instruments only).

- Contact Points
see pages 4-66 and 4-67
- Accessories
see page 4-42



Mechanical Dial Comparators with limit contacts



1103 N



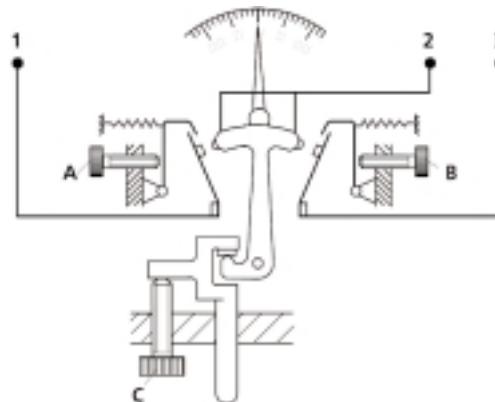
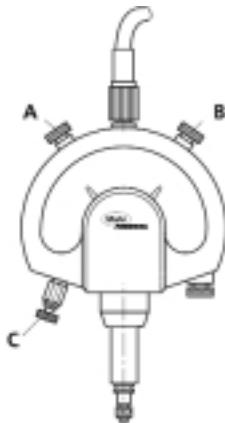
1110 N



1150 N

Features

- Use for tolerance control or as precision contactor in automatic control systems.
- Design features identical to mechanical dial comparators with the addition of high-grade, adjustable limit contacts.
- Limit contacts particularly well protected against vibration and mechanical wear.



Technical Data

Style	Measuring range	Graduation value	Accuracy ¹	Order number	
				standard ²	wetproof ³
Metric					
1103 N	$\pm 50\mu\text{m}$	1 μm	1 μm	4345100	4345105
1104 N	$\pm 0.13\text{mm}$	5 μm	3.5 μm	4344100	4344105
1110 N	$\pm 0.25\text{mm}$	0.01mm	6.5 μm	4343100	4343105
1150 N	$\pm 1.5\text{mm}$	0.05mm	35 μm	4342100	4342105
Inch					
1103 NZ	± 0.0020	.00005	.00005	4345910	4345915
1104 NZ	± 0.0050	.0001	.0001	4344910	4344915
1110 NZ	± 0.0100	.0005	.00035	4343910	4343915

¹ Accuracy of 1004 N, 1110 N, 1150N exceed DIN 879-1.

² Includes plastic case; Setting Knob 953, cable (1.2m), Adaptor 940 (for Inch instruments only).

³ Includes plastic case, Setting Knob 953, cable (1.2m), Splash Guard Cover 958, Rubber Bellows 970, Adaptor 940 (for Inch instruments only)

Electrical Specifications

- Contact Points
see pages 4-66 and 4-67
- Accessories
see page 4-42

Switching accuracy
with non-inductive
load of 10 mA/24 V

maximum
contact rating

maximum
contact voltage

maximum
contact current

1103 N	$\pm 0.3\mu\text{m}$
1104 N	$\pm 0.75\mu\text{m}$
1110 N	$\pm 1.5\mu\text{m}$
1150 N	$\pm 7\mu\text{m}$

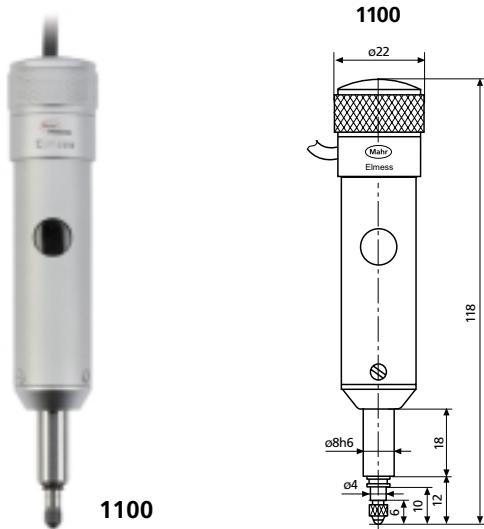
240 mW

24 V

100 mA

Dial Comparators

Mechanical Dial Comparator 1100 with limit contacts



Electrical Specifications

	Switching accuracy with non-inductive load of 10 mA/24 V	maximum contact rating	maximum contact voltage	maximum contact current
1100	±0.3µm / 12µin	240 mW	24 V	100 mA

Technical Data

	Range mm / in	Overtravel mm / in	Measuring force	Order number
1100	±0.4 / ±.016	2 / .078	1.5 N	4340000

Electrical Indicator 1141 SN for dial comparators and comparators with limit contacts



1141 SN

Features

- Indicator lamps: no-go (red), go (green) and no-go re-work (yellow) Sequence can be switched for outside and inside measurement
- Test results can be processed via control output
- Standard accessory: Mains adapter

Technical Data

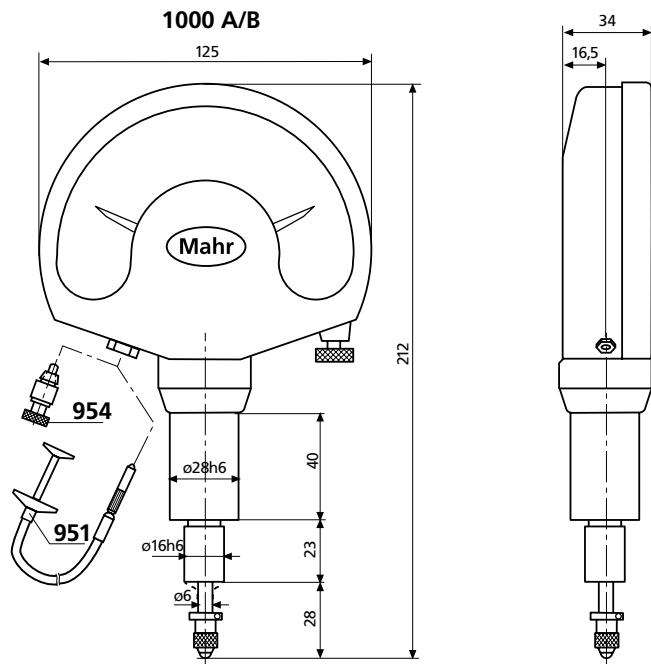
Housing dimensions (w x h x d)	82x52x150 mm
Contact voltage at dial comparator	6 V
Maximum contact rating	60 W
Maximum contact voltage	48 V
Maximum contact current	3 A
Power pack connections	5 V 250 mA
Main voltage	115 V
Order no. Box only*	4352310 (115 V)

*Cable ordered separately, see page 42.

Mechanical Dial Comparator Large Type Millimess



1000 A



Features

- Large design
- Clear dial
- Shockproof movement
- Jewelled movement bearings
- Measuring spindle mounted in high-precision ball guides precludes play
- Cable Release 951 and plastic case normally furnished

Technical Data

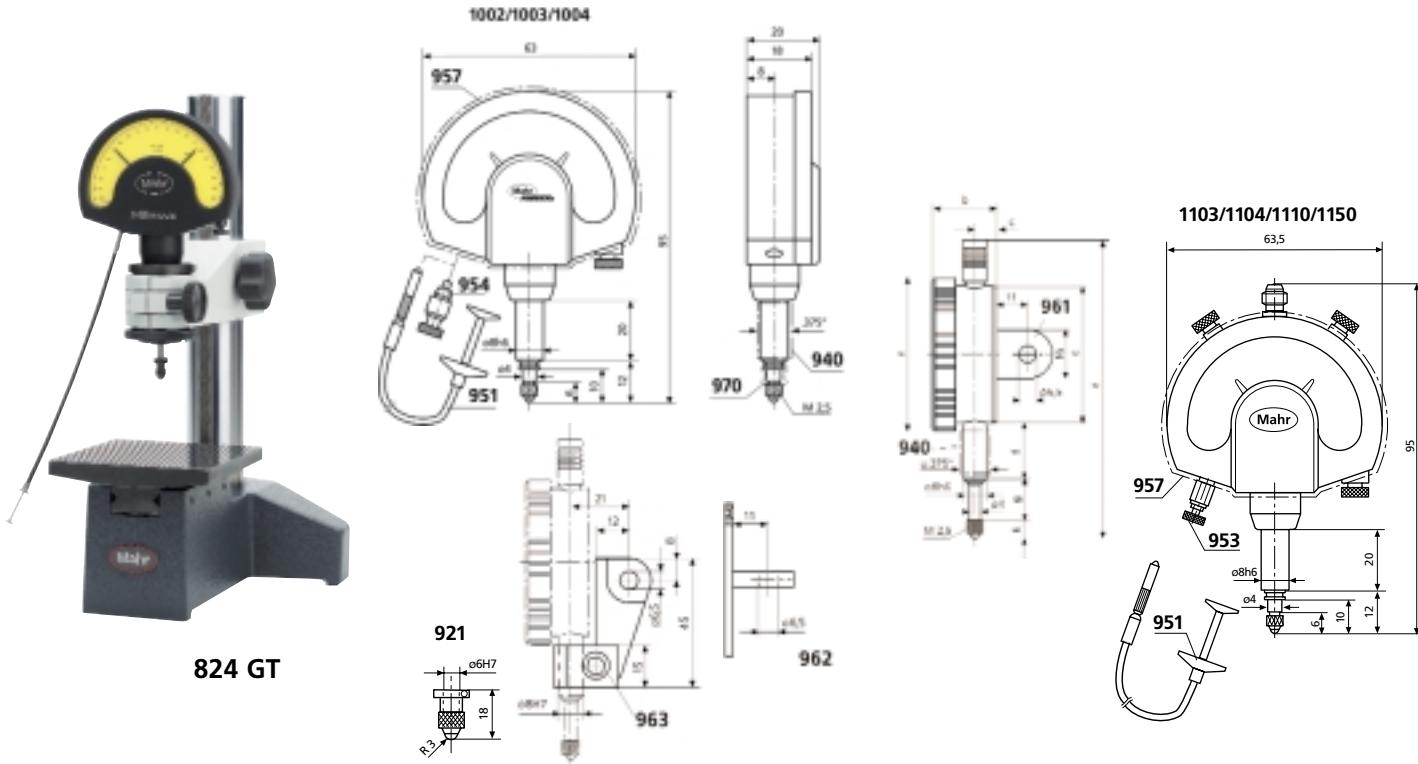
Style	Measuring range	Graduation value	Accuracy ¹	Order number
Metric				
1000 A	$\pm 100\mu\text{m}$	1 μm	1.5 μm	4338000
1000 B	$\pm 50\mu\text{m}$	1 μm	1.5 μm	4339000
Inch				
1000 Z	.00020	.00005	.00005	4339900
1000 Z	.00020	.000025	.00005	4339909

¹ exceeds DIN 879-1

Dial Comparators

Accessories for DIN dial indicators and dial comparators

		Use with	Order number
Adapter Bushing for adapting mounting shank 8h6 mm to inch bore .375in	940	All dial indicators and dial comparators, except metric 1000 types	4310103
Cable Release for lifting the measuring spindle	951	All types, except 803, 803 Z, 803 W, 810 U and 810 V	4372000
Splash Guard Covers for bezel dia. 58 mm for bezel dia. 40 mm	955 956	810, 810 L, 810 B, 810 Z 803, 803 Z	4373020 4373021
Splash Guard Cover	957	1000 Wetproof types	4373030
Splash Guard Cover	958	1103 N, 1104 N, 1110 N, 1150 N	4373031
Mounting Lugs	961	810 L, 810 V	4375010
Bore is perpendicular to mounting shank	962	810 L	4375011
Bore is parallel to mounting shank	963	All types, except 810 V	4375002
Lifting Knob for raising measuring spindle	954	All 1000 and 1100 types	4372030
Rubber Bellows for sealing open end of measuring spindle	970	All 1000 and 1100 types	4334786
Setting Knob for setting limit contacts without additional setting standard	953	1103 N, 1104 N, 1110 N, 1150 N	4372020
Measuring Attachments with steel ball with ruby ball	921 921 R	1000 A/B 1000 A/B	4362001 4362002
Precision Stand	824 GT	1000 A/B	4444200
Connecting Cable to 1141 SN Round Connector 1.2m length Round Connector 5.0m length Square Connector (old style Dial Comparator)		1103 N, 1104 N, 1110 N, 1150 N 1.2m length 5.0m length 1.2m length	4345695 4345694 4345697



Testing Test Indicators, Dial Indicators and Dial Comparators per DIN

All test indicators, dial indicators and dial comparators are inspected per ANSI or DIN Standards.

Optimar 100 is a bench-top unit with a measuring range of 100mm/4in. A high resolution measuring system, Optimar 100 complies with the Abbe principle to insure the most precise measurements possible. For more details see Catalog 3754921, Dimensional Metrology, Length, Form, Gear and Surface Texture Measuring Systems.

The following defined parameters, are tested:

- DIN 2270 (test indicators)
- DIN 878 (dial indicators)
- DIN 879 (dial comparators)



• **Span of error f_e** Span of error f_e is the distance between the ordinates of the highest and lowest points in the deviation diagram either when the plunger is being pressed in (dial indicators, dial comparators) or in the case of excursion of stylus against measuring force (test indicators).

• **Total span of error f_{ges}** The total span of error f_{ges} is the distance between the ordinates of the highest and lowest points in the deviation diagram when the plunger is being pressed in and let out (dial indicators, dial comparators) or in the case of excursion of stylus against and with the same direction of measuring force (test indicators). The total span of error includes the hysteresis error of the measured value f_u .

• **Local span of error f_t** Span of error f_t is the distance between the ordinates between the highest and lowest points in the deviation diagram, measured for a local measuring span of 10 scale divisions within 0,1 mm when the plunger is being pressed in (dial indicators, dial comparators) or in the case of excursion of stylus against measuring force (test indicators).

• **Repeatability f_w** Repeatability f_w is a characteristic for measured value fluctuations in measurements within the measuring span and with the same direction of movement of the plunger (dial indicators, dial comparators) or of the stylus (test indicators).

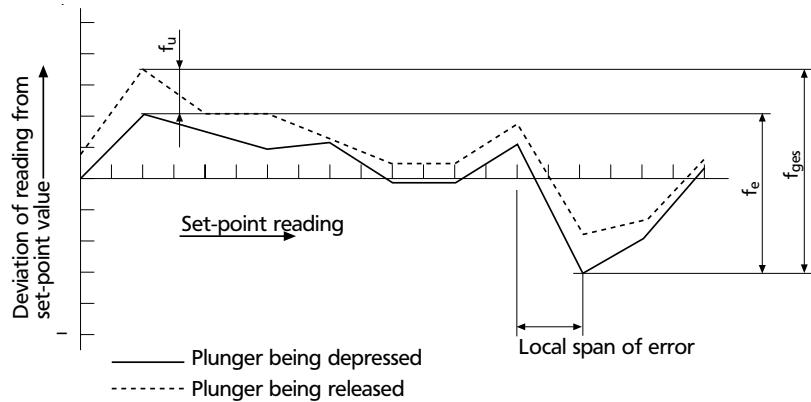


Diagram for the spans of error f_e and f_{ges} and hysteresis error of the measured value f_u (example)

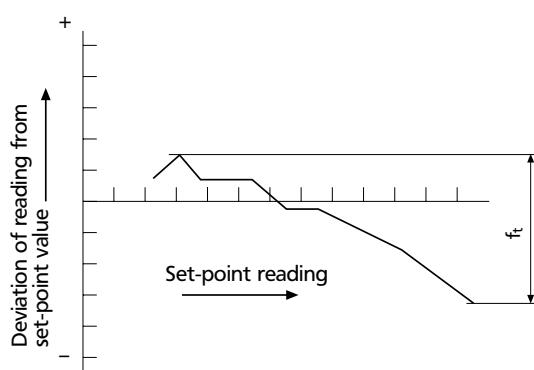


Diagram of the span of error f_t (example)

Indicator Calibrator with Digital Readout

Model 400B-50

- A precision, benchtop instrument, providing a convenient means for calibrating a wide variety of precision measuring instruments, including dial indicators, test indicators, AirProbes® electronic gage heads, or any other device that magnifies the linear displacement of a contact point or measuring spindle – user selectable for either inch or metric units.
- Two calibration stations provide high magnification and long range in a single unit. Incorporated within the micrometer-style control is a rotary encoder which senses the amount of movement and displays the actual displacement on a digital readout.
- Digital readout consists of six high visibility, LED digits and operator-accessible controls for inch/metric units, range selection, zero reset, and polarity/direction.



400B-50
Indicator Calibrator
with Digital Readout

Technical Data

		Range	Minimum Graduation	Accuracy
Inch	High mag. station	.100	.00001	$\pm 10\mu\text{in}$
	Low mag. station	.500	.00005	$\pm 50\mu\text{in}$
Metric (mm)	High mag. station	2.5	0.0001	$\pm 0.2\mu\text{m}$
	Low mag. station	12.5	0.0005	$\pm 0.5\mu\text{m}$
Dimensions (approx.)				
Calibrator	Display	6-digit, 7-segment LED		
Readout Unit	Output	RS-232		
Weight (approx.)	Power	115Vac/60Hz/220Vac/50Hz-switchable		
Calibrator		330 x 200 x 285mm h/13 x 8 x 11.25in h		
Readout Unit		170 x 125 x 80mm h/6.625 x 5 x 3.25in h		
Weight (approx.)				
Calibrator		11.8 kg/26 lb.		
Readout Unit		0.8 kg/1.75 lb.		

Upgrade Kit

EKT-1204

A kit is available to upgrade Models 400B-5 and 400B-25 Universal Calibrators to digital readout units with RS-232 output. The kit consists of a precision micrometer style controller with a digital encoder, which replaces the mechanical head, plus a digital readout unit.

- Normally furnished:
AM-178 Arm Assembly;
AT-119 Mounting Clamp for .375in/9.5mm dia. stems and probes;
BU-112 Bushing (.218in I.D. to .375in O.D.).
BU-197 Bushing (8mm I.D. to .375in O.D.).
AT-117 Adaptor for holding gage blocks.

- Also Available:
AT-120 Adaptor for test indicators with long contacts.
AT-122 Adaptor for test indicators with short contacts.
AT-121 Adaptor for AGD type indicators with lug backs.

Dial Indicator Calibrator

Two styles to suit your quality control needs.

400B-3 and 400B-4 Shop-floor Calibrators

- For checking dial indicators (both ANSI/AGD and perpendicular styles) and other transducers.
- Large micrometer wheel has widely spaced graduations for easy setting and reading.
- Adjustable crosshair provides on-the-mark setting.
- Tungsten carbide anvil for maximum wear resistance.
- Indicator clamped in-line with micrometer spindle.



**400B-3
Dial Indicator
Calibrator**

- Normally furnished:
BU-112 Bushing (.218in I.D. to .375in O.D.);
AD-58 Bushing (.275in I.D. to .375in O.D.);
BU-197 Bushing (8mm I.D. to .375in O.D.).

* Accuracy calibration as specified in Federal Specification GGG-105B.

Universal Calibrator

Model 400B-5 and 400B-25

- Highest accuracy calibrator for precise monitoring of any gaging transducer—mechanical Indicator, air probe, or electronic gage head.
- Two calibrating stations: one for high magnification transducers and one for long range (up to 12.5mm/.500in).
- Easy to use: fine adjustment; large bi-directional reading micrometer head; carbide reference anvils; adjustable viewing angle.
- Furnished in a fitted wooden storage case.



**400B-5
Universal
Calibrator**

- Normally furnished:
AM-178 Arm Assembly;
AT-119 Mounting Clamp for 9.5mm/.375in dia. stems and probes;
BU-112 Bushing (.218in I.D. to .375in O.D.);
BU-197 Bushing (8mm I.D. to .375in O.D.);
AT-117 Adaptor for holding gage blocks.
- Also Available:
AT-120 Adaptor for test indicators with long contacts;
AT-122 Adaptor for test indicators with short contacts;
AT-121 Adaptor for AGD type Indicators with lug backs.

Technical Data

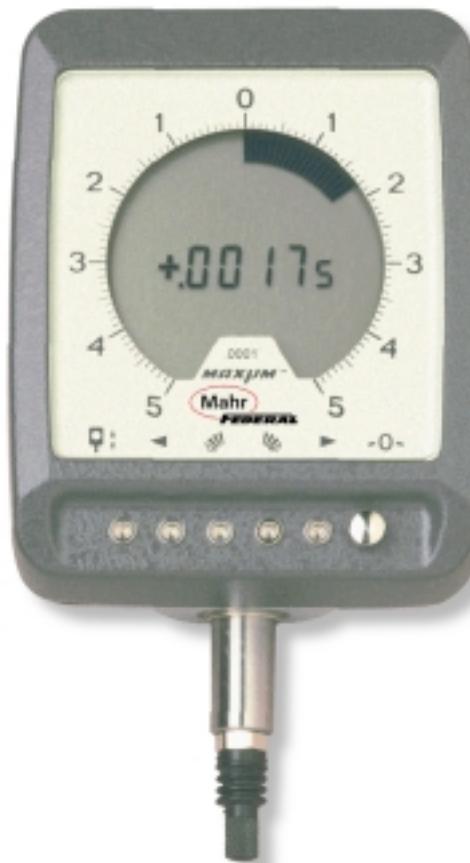
	Order number	Range	Minimum Graduation	Accuracy
Metric (mm)	400B-25	2.5 12.5	0.0002 0.001	$\pm 0.2\mu m$ $\pm 0.5\mu m$
Inch	400B-5	.100 .500	.000010 .000050	$\pm 10\mu in$ $\pm 25\mu in$

Maxum® Digital Indicators

... A practical alternative to Dial Indicators.

Features

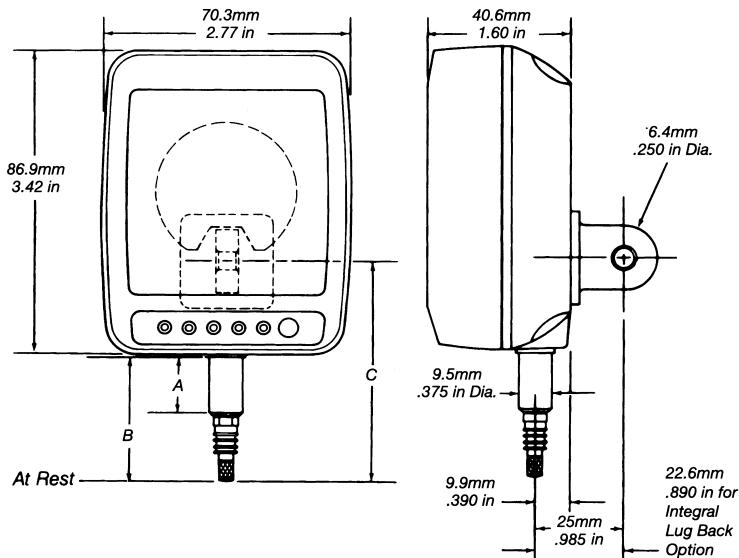
- Display Features: Digital display and unique "fan" analog display give the best of both worlds – digital accuracy and readability with analog "feel" for trend and change. Least count digital "grad-splitter" allows interpolation of the analog display. Display can read "plus" or "minus" when spindle is fully extended. Other features include electronic zero setting, tolerance flags, and true spindle position mode for setup.
- "Absolute" Transducers – never an overspeed error... no missed counts... no misreadings.
- Battery powered – long life battery provides a full year of operation.
- Digital Output, optional, compatible with all common Statistical Quality Control systems.
- Easily used on snap gages, bore gages, comparator stands and fixture gages.
- Both self-contained and remote-readout versions available.



DEI-11111
Maxum Indicator

Mahr Federal Maxum® Indicator Dimensions

Easily designed into your applications ... full-size Maxum Indicator and Accessories tracing templates or CAD files available on request.



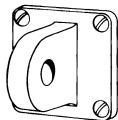
A	B	C
For short range indicators – Std. Stem Length ($\pm 1.0\text{mm}/\pm .40\text{in}$ range indicators)		
17mm/.670in	36mm/1.42in	63.5mm/2.50in
For long range indicators – Std. Stem Length ($\pm 1.99\text{mm}/\pm .100\text{in}$ range indicators)		
22mm/.87in	47mm/1.84in	73mm/2.87in
For both short and long range – Long Stem Lengths		
38mm/1.5in 51mm/2in 76mm/3in	57mm/2.25in 70mm/2.75in 95mm/3.75in	84.6mm/3.33in 97.3mm/3.83in 123mm/4.83in

Digital Indicators

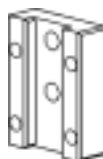


Maxum Backs

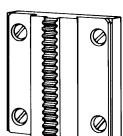
For Indicators and Indicating Units. (Supplied with mounting screws)



Lug Back
.250in hole)
Mounts horizontally or vertically.
Order Number EBK-1006.



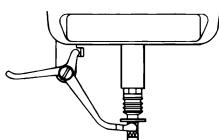
Adjustable Slide Back
.500in slot, 1/4-20 thread)
Order Number EBK-1007.



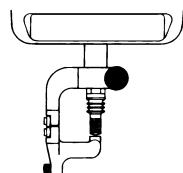
Rack Back
Fits SE-33 (shown) and SE-73.
Adjustable Mounting Block
(not shown).
Order Number EBK-1005.

Replacement Screws
2-56 x .218in.
Order Number ESW-1252.

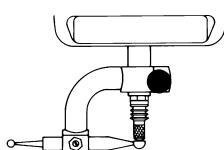
Other Accessories*



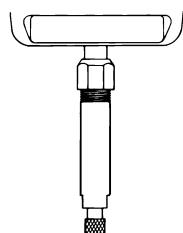
Lifting Levers¹
Furnished with washer and longer
contact point. Left Hand (shown)
Order Number EAS-1903.
Right Hand (not shown)
Order Number EAS-1904.
¹(For use on .670in stem length only,
DEI-XX1X1)



Right Angle Attachments
Lever Type (not shown)
(±.187in maximum range)
Order Model EAT-1034-W1.
Spring Type (shown)
(±.060in maximum range)
Order Model EAT-1035-W1.



Hole Attachments
Short Lever (shown)
(1.0in pivot to contact)
Order Model EAT-1032-W1.
Long Lever (not shown)
(1.87in pivot to contact)
Order Number EAT-1033-W1.



Auxiliary Plunger
3in long, .500in O.D.
Order Number EAS-1912.



Ox-Bow Lifting Lever
Order Number LR-40.

* Other Accessories shown are for .375in stem models.
Equivalent types are available for most Maxum models
having 8mm stems. Adaptor Bushing (BU-197) may also
allow 8mm stem indicators to be used with the above accessories.
Full size Maxum Indicator and accessories tracing
templates are available on request.

Batteries

EBY-1011:	3.6 V lithium battery -Tadiran #15-51-03-210-000
ECS-1196:	Battery Cap, (for 3.6 V lithium battery) - 2 required

Temp. range:

Operating:	10° to 55°C/50° to 130°F
Storage:	-20° to 65°C/4° to 149°F
ECV-1307-W1	Splash Cover for DEI Indicator

Mating Connectors

Part no.	For Maxum Model	Connector Pins
ECN - 1521	E1 - Maxum Plus	6
ECN - 1689	E2 - Maxum Plus	10
ECN - 1688	E3 - Maxum Plus	7

Remote Switch Assembly (for Hold/Reset)

	E 2 Series	E 3 Series
Handswitch	EAS-2867	EAS-2867/V-XXXX
Footswitch	EAS-2868	EAS-2868/V-5797

Remote Maxum Indicating Units and Tranducers

... A slimmer transducer provides an affordable alternative for fixture gaging.

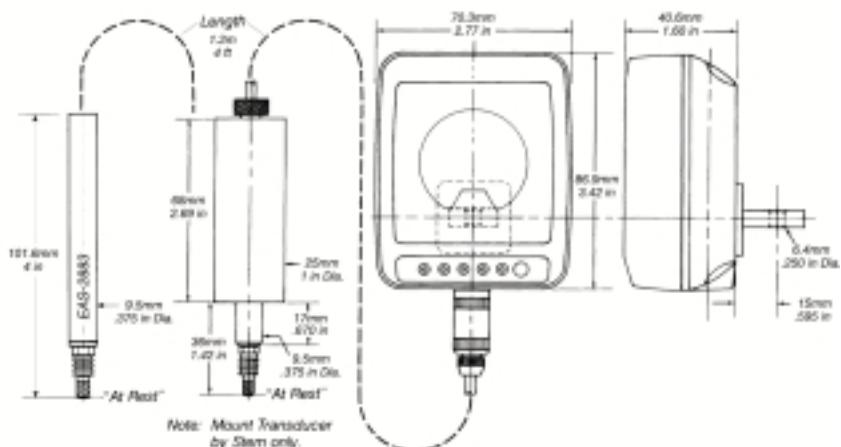
Features

- Replaces Dial Indicators on fixture gages.
- Provides digital readout and SPC capability – at an affordable price!
- Makes multi-indicator fixtures easy to read.
- The Maxum Indicating Unit with remote transducer is a practical, affordable electronic alternative to dial indicators for fixture gaging.
- With only one moving part, the measuring spindle, the Transducer is designed for easy maintenance, without stores of spare parts, special tools or special training. Both the Transducer and the Indicating Unit are fully sealed against contaminants, and stand up to hard use in the shop.
- Mount Indicating Units side by side on a convenient rack or panel for quick, easy reading. The Remote Transducers can be set up on new or existing fixtures in place of dial indicators or other gage heads. A full range of stem lengths, contact points, mounting brackets and accessories is available.
- Mahr Federal's .375in Maxum Remote Transducer is a ruggedly constructed, hardened stainless steel unit, designed to withstand tough, shop floor conditions.
- The Maxum .375in Transducer meets form factors of more expensive amplifier/gage head systems and can be mounted side by side on a convenient rack or panel for quick and easy direct readings, making fixture gaging even more versatile.
- Remote transducers can be easily set up on new or existing gage head fixtures in place of dial indicators or other gage heads.



**Maxum Plus Indicating Unit
with .375in Remote
Transducer EAS-2883***

* Indicating Units sold separately.



Easily designed into your applications ... full-size Maxum Indicator and Accessories tracing templates or CAD files available on request.

*Stem length selectable - see ordering info

Mounting Racks for Indicating Units

For convenient mounting of Maxum® Indicator Units.
Adjusts for optimum viewing angle.

Four Unit Rack

(approx.) 178mm/7in x 152mm/6in x 228mm/9in high.
Order Number EAS-2028-W1.

Eight Unit Rack

(approx.) 330mm/13in x 152mm/6in x 228mm/9in high
Order Number EAS-2028-W2.

Digital Indicators



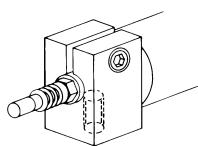
Remote Transducers for Maxµm Indicating Units – Ordering Information

.375in Dia. Stem	8mm Dia. Stem	Stem Length	Connector
Transducers for $\pm .040\text{in}$, $.020\text{in}$ and $.010\text{in}$ Indicators			
EAS-2104-W1	EAS-2105-W1	17mm/.670in	6 pin, split
EAS-2104-W2	EAS-2105-W2	38mm/1.5in	6 pin, split
EAS-2104-W3	EAS-2105-W3	51mm/2in	6 pin, split
EAS-2104-W4	EAS-2105-W4	76mm/3in	6 pin, split
9.5mm/.375in diameter Transducer			
EAS-2883 – for use on Maxµm & Maxµm Plus Indicators with $1.00\text{mm}/\pm .040\text{in}$ and under range.			
Transducers for $\pm 1.99\text{mm}/\pm .100\text{in}$ digital range Indicators*			
EAS-2863-W1	EAS-2864-W1	22mm/.870in	8 pin, round
EAS-2863-W2	EAS-2864-W2	38mm/1.5in	8 pin, round
EAS-2863-W3	EAS-2864-W3	51mm/2in	8 pin, round
EAS-2863-W4	EAS-2864-W4	76mm/3in	8 pin, round

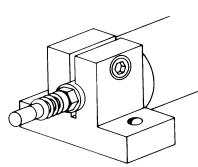
* Long Range Transducers can only be used with long range remote Maxµm® or Maxµm Plus display units. (Ranges $\pm 1.99\text{mm}/\pm .100\text{in}$)

- .375in Diameter Stem Transducers are normally furnished with regular contact point, .18in radiused, .25in long, 4-48 thread.
- 8mm Diameter Stem Transducers are normally furnished with regular contact point, .18in radiused, 6mm long, M2.5 thread.
- For Metric Contact Points - see pages 66 & 67.
- For alternate cable lengths - call Mahr Federal's Technical Assistance.

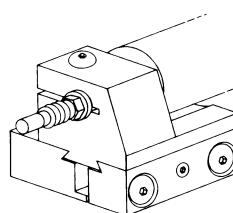
Mounting Brackets for Remote Transducers*



Square Bracket
(1/4-20 mounting thread)
Order Model AAD-67.



T Bracket
Flange mounted.
Order Model AAD-91.



Rack Bracket
(Shown mounted to
SE-33 Adjustable
Mounting Block.)
SE-33 and SE-73
Adjustable Mounting
Blocks are available
separately. SE-33 is
supplied with hex-
screw adjust. SE-73 is
supplied with knob adjust.
Order Model EAD-1007-W1.

* Mounting Brackets shown are for .375in stem models. Equivalent types are available for most Maxµm models having 8mm stems. Adaptor Bushing (BU-197) may also allow 8mm stem indicators to be used with the above accessories. Full size Maxµm Indicator and accessories tracing templates are available on request.

Digital Indicators

Selecting Model Numbers for Standard Max^{um}, Max^{um} Plus & Indicating Units for Remote Transducers

Stem and Location

	6 o'clock	12 o'clock	Code
.375in diameter	6 o'clock	1	
	12 o'clock	2	
8mm diameter	6 o'clock	3	
	12 o'clock	4	
Remote Indicating Units¹			
	6 o'clock	7	
	12 o'clock	8	

¹ These Models use the Stem Length suffix "O".

Remote Transducer purchased separately.

² High resolution unit.

³ Standard unit.

DEI- X

X

1

Digital Range	Code
$\pm .010\text{in}^2$	0
$\pm .010\text{in}^3$	1
$\pm .020\text{in}$	2
$\pm .040\text{in}$	3
$\pm 0.199\text{mm}$	4
$\pm 1.00\text{mm}$	5
$\pm 1.99\text{mm}$	6
$\pm 100\text{in}$	7

(See further specifications below)

Digital Range & Technical Data

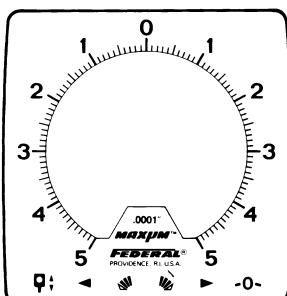
Code	Digital Range	Digital Minimum Value	Analog Range	Analog Minimum Graduation	Pre-Travel	Over-Travel	Accuracy (% of Digital Range)
0	$\pm .010\text{in}$	.00002in	$\pm .005\text{in}$	.0001in	.040in	.060in	$\pm 0.5\%$
1	$\pm .010\text{in}$	.00005in	$\pm .005\text{in}$	.0001in	.040in	.060in	$\pm 0.5\%$
2	$\pm .020\text{in}$	.0001in	$\pm .020\text{in}$	.0005in	.030in	.050in	$\pm 0.5\%$
3	$\pm .040\text{in}$	.0001in	$\pm .040\text{in}$	.001in	.010in	.030in	$\pm 1.0\%$
4	$\pm 0.199\text{mm}$	0.001mm	$\pm 0.050\text{mm}$	0.001mm	1.1mm	1.6mm	$\pm 0.5\%$
5	$\pm 1.00\text{mm}$	0.001mm	$\pm 0.50\text{mm}$	0.01mm	0.3mm	0.8mm	$\pm 1.0\%$
6	$\pm 1.99\text{mm}$	0.001mm	$\pm 0.50\text{mm}$	0.01mm	0.5mm	0.75mm	$\pm 0.35\%$
7	$\pm 100\text{in}$	.0001in	$\pm 0.050\text{in}$	.001in	.020in	.030in	$\pm 0.35\%$

Total range of spindle travel: .120in/3.05mm (all models except $\pm 100\text{in}$ version which has .250in/6.4mm); for restricted pre-travel contact Mahr Federal Technical Assistance.

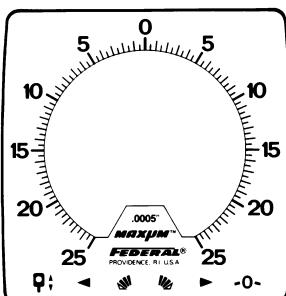
Gaging force: 3 oz./85 g nominal at center of spindle travel. (Other gaging forces available – call Technical Assistance)

Power requirements: Single 3.4V lithium battery. Order No. EBY-1011 (Requires End Caps, ECS-1196).

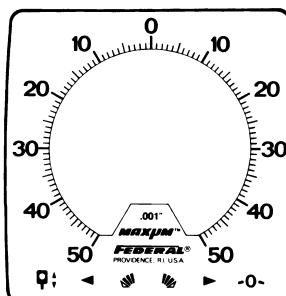
Inch



for $\pm .010\text{in}$ Range



for $\pm .020\text{in}$ Range



for $\pm .040\text{in}$ and $\pm 100\text{in}$ Range

Digital Indicators



Selecting Model Numbers for Standard Maxum, Maxum Plus & Indicating Units for Remote Transducers

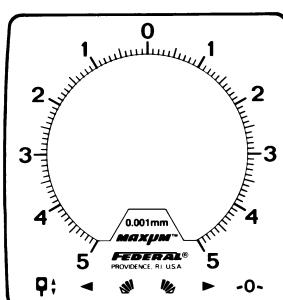
 X	 X	—	 X ⁴
Measurement Direction			
 Clockwise, minus to plus	Code 1		
 Counter-clockwise, plus to minus	Code 2		
Stem Length			
17mm/.670in (for $\pm 1.0\text{mm}/\pm .40\text{in}$ range indicators)	Code 1		
22mm/.87in (for $\pm 1.99\text{mm}/\pm 1.00\text{in}$ range indicators)	Code 1		
38mm/1.5in	Code 2		
51mm/2.0in	Code 3		
76mm/3.0in	Code 4		
Remote Indicating Unit			
No Stem	Code 0		
Output			
 Maxum No Output	Code Blank		
Digital Output	Code D		
Maxum Plus Digital Output	Code E1		
Digital Output with Hold & Reset	Code E2		
Serial Output with Hold & Reset	Code E3		

4 All units use standard Flat Back except Integral Lug Back units. Integral Lug Back units are standard with Digital Output and available on 6 o'clock stem models only. For Integral Vertical Lug Back, add suffix "A" to the end of the Model Number. For Horizontal Lug Back, add suffix "B" to the end of the Model Number.

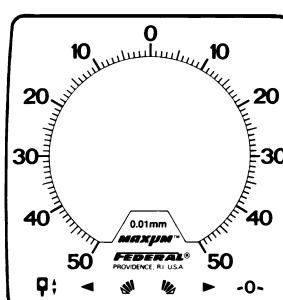
Example 1: Model DEI-11111-E1A is a Maxum Plus with a .375in stem at the 6 o'clock position; $\pm .010\text{in}$ range; measurement direction clockwise with minus sign showing when the spindle is extended; stem length 17mm/.670in; equipped with Digital Output; and an Integral Vertical Lug Back.

Example 2: Model DEI-71110-D is a Maxum Remote Indicating Unit with a connector at the 6 o'clock position; $\pm .010\text{in}$ range; measurement direction clockwise with minus sign showing when the spindle is extended; and is equipped with Digital Output.

Metric



for $\pm 1.99\text{mm}$ Range



for ± 1.00 and $\pm 1.99\text{mm}$ Range

μMaxum® Digital Indicators

The most valueable electronic indicator for high production measurements.

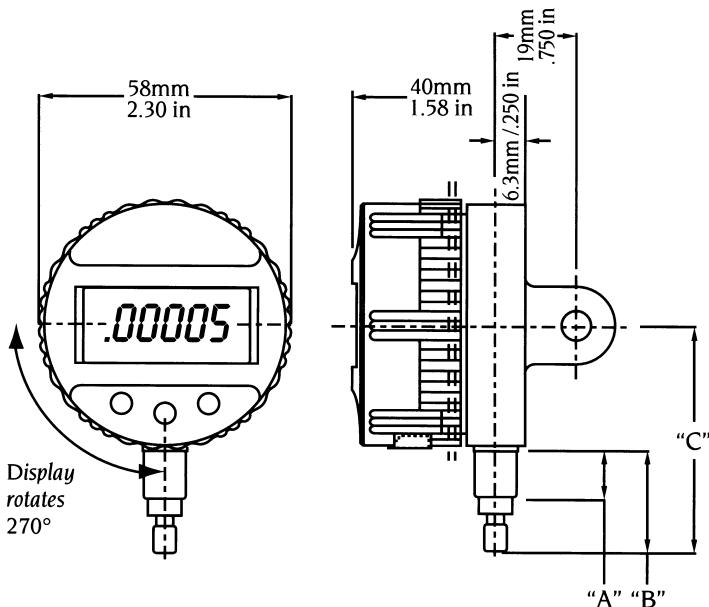
Features

- Inch/Metric – operator selectable with switchable Inch resolution.
- Normal/Reverse Sensing
- Preset capabilities
- Optional Calibration Lockout feature.
- "Absolute" Transducer – no overspeed errors or constant re-zeroing. Federal's unique transducer always remembers its location – even when power is off.
- High resolution digital readout and analog bar graph – digital display shows deviation from zero or a preset value.
- Lightweight, contamination resistant – ruggedly built to withstand hard use – gasketed case, crystal and stem assemblies resist fluid contamination.
- Calibratable – if ever needed – values remembered even after battery change.
- Data output – 2 popular formats – 7-pin recessed connector
- Auto power down – provides extremely low battery consumption, assuring long life from readily available commercial batteries.
- Unilateral Tolerances.
- Go/NoGo Display Feature.



Mahr Federal's High-Resolution Micro-Maxum® Indicator

- Increased resolution (0.0005mm/20µin) for today's demanding tolerances.



A	B	C
11.7mm/.46in 38mm/1.50in	24.1mm/.95in 57.2mm/2.25in	53.6mm/2.11in 86.6mm/3.41in

- Contact Points
see pages 4-66 and 4-67

Digital Indicators



μMaxum Digital Indicators

Technical Data

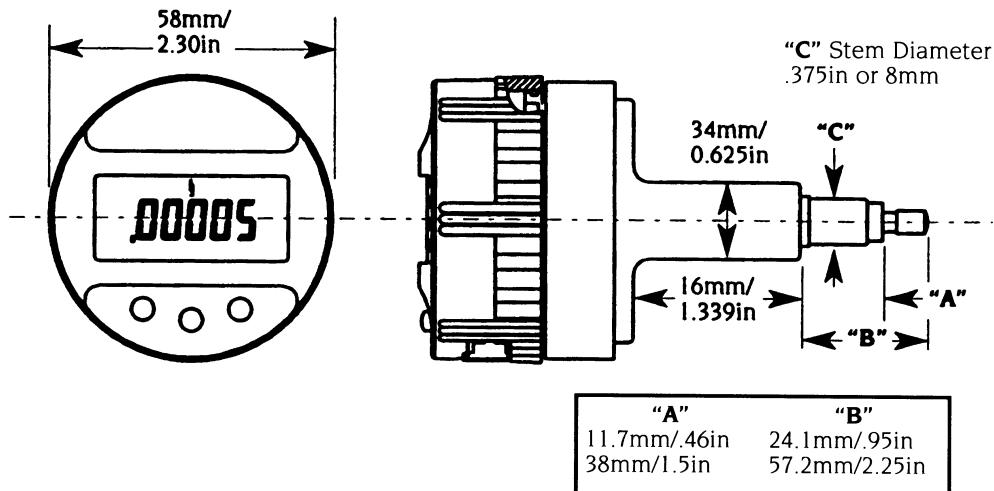
Range and Resolution

		Standard Units		High Resolution Units	
Display	Range	Resolution	Accuracy % of Digital Range	Resolution	Accuracy % of Digital Range
Inch	±.040in	.00005in/.0001in (switchable)	±.5% over ±.040in ±.25% over ±.020in	.00002in	±.5% over ±.040in ±.25% over ±.020in
Metric	±1.0mm	0.001mm (1µm)	±.5% over ±1.00mm ±.25% over ±.500mm	.0005mm	±.5% over ±1.00mm ±.25% over ±0.50mm

Specifications

Spindle Range	-.050in to +.060in / (-1.28 to +1.5mm)
Repeatability	±1 digit
Contact Point	(Normally furnished — PT-223) for .375in dia. stem, .250in long, radiused tip, 4-48 thread; (EPT-1037-W1) for 8mm dia. stem, 6mm long, radiused tip, M2.5 mm thread
Gaging Force	85-112 g/3-4 oz. (at center of spindle travel) Other gaging forces available — call Technical Assistance
Power	3 volt lithium coin cell (2 per unit, consumer type, CR 2450) Mahr Federal Model Number: EBY-1018
Battery Life	nine months normal usage or 3000 hours
Weight	approx. 170 g/6 oz.
Display	Rotates through 270°
Operating Temperature	50° to 130° F

Perpendicular μ Maxum



μMaxum Digital Indicators

Ordering Information

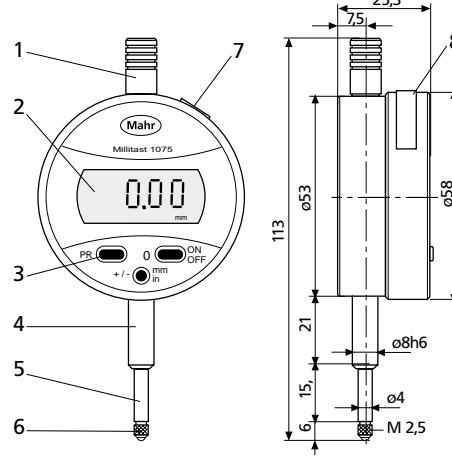
μMaxum Indicators Model Number: EDI- X X X 0 X													
Style	Range	Resolution	Code										
Standard	±1mm/±.040in	1.25mm/50µin	1										
High Resolution	±1mm/±.040in	1.25mm/20µin	2										
Standard Perpendicular	±1mm/±.040in	1.25mm/50µin	3										
High Resolution Perpendicular	±1mm/±.040in	1.25mm/20µin	4										
<table border="1"> <thead> <tr> <th>Ratio</th> <th>Code</th> </tr> </thead> <tbody> <tr> <td>1:1</td> <td>0</td> </tr> <tr> <td>4/5</td> <td>1</td> </tr> <tr> <td>Calibration Lockout, 1:1</td> <td>2*</td> </tr> <tr> <td>Calibration Lockout, 4/5</td> <td>3*</td> </tr> </tbody> </table>				Ratio	Code	1:1	0	4/5	1	Calibration Lockout, 1:1	2*	Calibration Lockout, 4/5	3*
Ratio	Code												
1:1	0												
4/5	1												
Calibration Lockout, 1:1	2*												
Calibration Lockout, 4/5	3*												
<table border="1"> <thead> <tr> <th>Stem Diameter/Length</th> <th>Code</th> </tr> </thead> <tbody> <tr> <td>.375in/.46in</td> <td>1</td> </tr> <tr> <td>.375in/1.5in</td> <td>2</td> </tr> <tr> <td>8mm/.46in</td> <td>3</td> </tr> <tr> <td>8mm/1.5in</td> <td>4</td> </tr> </tbody> </table>				Stem Diameter/Length	Code	.375in/.46in	1	.375in/1.5in	2	8mm/.46in	3	8mm/1.5in	4
Stem Diameter/Length	Code												
.375in/.46in	1												
.375in/1.5in	2												
8mm/.46in	3												
8mm/1.5in	4												

* Requires Calibration Access Key, EKY-1024 (sold separately).

Accessories

Order Number	Type
EBK-1010	Lug Back
EBK-1018	Flat Back
EBK-1012	Post Back
EBK-1013	Screw Back
EBK-1014	Back for Adjustable Mounting Brackets like AT-28 and AT-116 (slide sold separately)
EBK-1016	Adjustable Back (.5in slot x 1/4 - 20 thread)
ECN-1720	Mating Connector (7 Pin)
ECB-1951	Output Cable to Digimatic
SCB-4	Serial output cable to DB-9pin
ECV-1307-W2	Dust Cover
EKY-1024	Calibration Access Key
SP-351	Spring – for lighter gaging force: 35g/1.2oz.

Digital Indicator 1075 Millitast



- 1 Protective lifting cap for measuring spindle
 2 Display
 3 Operating buttons
 4 Mounting shank
 5 Measuring spindle
 6 Contact point 901
 7 Data output
 8 Battery compartment

Features

- Functions:
 ON/OFF
 0 (zero setting)
 mm/inch
 Reversal of counting direction
 PRESET (for entering any numerical value)
- DATA (data transmission with data connection cable)
- Capacitive measuring system, life of battery approx. 2 years
- Measuring speed 1.5 m/s (60in/s)
- Data output: optional Opto RS232C or Digimatic
- High contrast 8.5 mm liquid crystal display
- Protective housing (back wall integrated in housing)
- Raising of measuring spindle via lifting cap or cable release 951 (Accessories)
- Operating temperature 10-40°C
- Class of protection IP 51

Technical Data

Measuring range mm / inch	Resolution mm / inch	Span of error f [*] mm / inch	Measuring force N	Weight g	Order no.
12.5 / .5	0.01 / .0005	0.02 / .001	0.7 - 1.1	110	4336400
12.5 / .5	0.01 / .0005	0.02 / .001	0.7 - 1.1	110	4336410**

* indicated value +1 resolution

** .375 in Stem Diameter

Accessories

	Order no.		Order no.
Battery 3V, Type CR 2032	4102520	Contact Points	901-913
Data Connection Cable Opto RS232C (2m), with SUB-D jack 9-pin	16 EXr 4102410	Special Holder	941
Data Connection Cable Digimatic (2m), Flat connector 10-pin	16 EXd 4102411	Sensor Lever	943
Adapter Bush for adapting mounting shank 8h6 mm to inch bore .375in	940 4310103	Additional Accessories & Contacts (Page 4-66 & 4-67)	
Cable Release for lifting measuring spindle	951 4372000	Accessories for data processing see chapter 10	
Mounting Lug for mounting on mounting shank 8h6 mm	963 4375002		

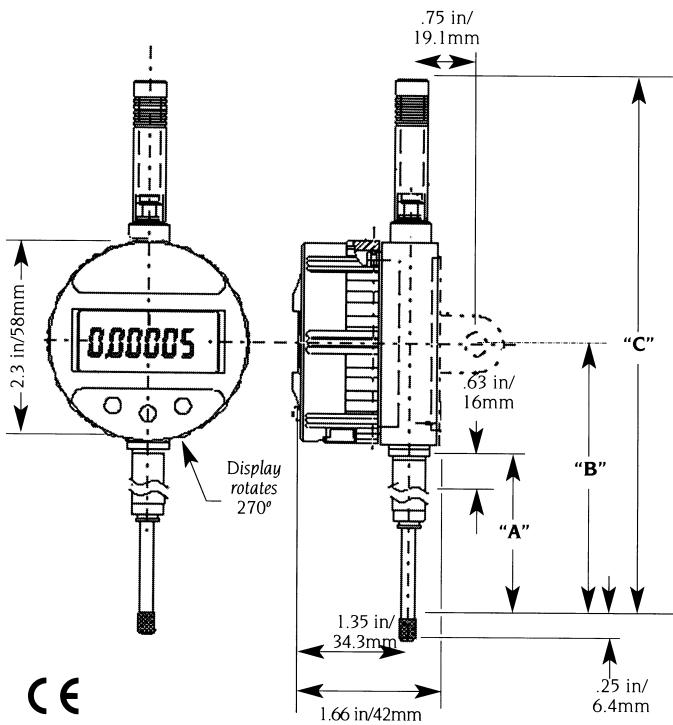
μMaxum® XL Digital Indicators

... Long measuring range and ANSI/AGD Group 2 convenience

Features

The μMaxum XL Series offers all the benefits of Federal's μMaxum Indicators and is designed for convenience, ease of use, dependability and rugged shop floor handling ... plus:

- Long measuring ranges of 12.5mm/.5in, 25mm/1in, 50mm/2in and 100mm/4in.
- Digital resolution is switchable between 0.0001in or 0.00005in, and 1µm.
- The XL never loses zero, even when powered down.
- Features easy to use controls.
- Preset capabilities for direct dimension readout.
- Unilateral tolerances.
- Go/no-go display for foolproof operation.
- Large digital/analog dual display for fast, accurate readings.
- Two-format data output, serial or Digimatic, is compatible with most data collection devices.
- World version furnished with metric stem sizes and contact threads.
- Versions also available for deadweight applications with compressible materials.
- Special ratio and lockout versions also available.



XLI Models & XLT Models

Range	"A"	"B"	"C"
12mm/.5in	35.1mm/1.38in	68.6mm/2.7in	128.27mm/5.05in
25mm/1in	47.5mm/1.87in	81.3mm/3.2in	153.7mm/6.05in
50mm/2in	72.64mm/2.86in	153mm/6in	275.6mm/10.85in
100mm/4in	123mm/4.88in	253mm/9.97in	427mm/16.8in

Ordering Information

μMaxum XL Indicators Order number: XLI - X 0 0 X			
Model	Range	Stem Diameter/ Length	Code
U.S. version	±0.5in	.375in/0.63in	1
U.S. version	±1.0in	.375in/0.63in	2
World version	±12.5mm	8mm/16mm	3
World version	25.0mm	8mm/16mm	4
World version	25.0mm	8mm/ No Spring	5*

* Deadload Model (used with weights)

Ratio	Code	Back	Code
1:1	0	Flat Back (BK-470)	0
4/5	1	Lug (BK-183)	1
		Adjustable (BK-531)	2
		Post (BK-2093)	3
		Screw (BK-692)	4
		Adaptor Back for 75B Gage (EPL-1914)	5

Examples: XLI-10001 is a μMaxum XL with ±0.5in range, .375in stem diameter, 0.63 in/16 mm stem length, and a Lug Back.

A Model XLI-40004 is a μMaxum XL with a 25.0mm range, 8mm dia. stem, 16mm stem length, and a Screw Type Back.

μMaxum XT Indicators Order number: XLT - X 0 0 0 X			
Version	Range	Stem Diameter/ Length	Accuracy
World	50mm	8mm/15mm	High:8μm/.000320in
World	50mm	8mm/15mm	Std:20μm/.0008in
World	100mm	8mm/15mm	High:9μm/.000360in
World	100mm	8mm/15mm	Std:20μm/.0008in

Back	Code
Flat Back (EBK-1020)	0
Lug (BK-383)	1
Adjustable (BK-531)	2
Post (BK-2093)	3
Screw (BK-692)	4

XLT Models include 3/8 in bushing, M2.5 to 4-48 adaptor, and PT-223 Contact point.

For additional contact points see pages 64-67

Technical Data

Model no.	Range	Resolution	Accuracy	Gage Force	Weight
XLI Resolution Fixed	12.7mm/.050in	0.0001mm/0.00005in	0.005mm/0.0002in	0.8N/3-4oz.	200g/7oz.
	25.4mm/1.0in				
XLT Standard Accuracy Resolution Selectable	50mm/2.0in	0.01mm/0.0005in 0.02mm/0.001in	0.02mm/0.0008in	0.8-1N/7-11oz.	200g/10oz.
	100mm/4.0in	0.05mm/0.002in 0.1mm/0.005in		2.3-4N/8-14oz.	340g/12oz.
XLT High Accuracy Resolution Selectable	50mm/2.0in	0.001mm/0.00005in 0.002mm/0.0001in 0.005mm/0.0002in 0.01mm/0.0005in	.008mm/.00032in	0.8-1N/7-11oz.	200g/10oz.
	100mm/4.0in	0.02mm/0.001in 0.05mm/0.002in 0.1mm/0.005in		2.3-4N/8-14oz.	340g/12oz.

XL Common Specification Values

Output:	Serial BCD, 13 digits, 52 bits; ASCII encoded 2400 baud asynchronous stream.
Spindle Velocity:	60 in/sec (1.5m/sec) Maximum
Operating Temps:	40° to 105° F / 5° to 40° C
Storage Temps:	- 40° to 140° F / -20° to 60° C
Repeatability:	± 1 least significant digit
Battery life:	12 months normal use or 4000 hours. (May be less with "No Auto Power Down Option")

Digital Indicator 1082



Features

- Functions:
ON/OFF
RESET (zero setting)
PRESET (set buttons can be used to enter any numerical value)
mm/inch-switch
DATA (data transmission)
HOLD (storage of current measuring value)
- Capacitive measuring system, life of battery approx. 2 years
- Max. measuring speed 1.5m/s (60in/s)
- Data output: Opto RS232C
- High-contrast, 8.5 mm liquid crystal display
- Function and display section can be rotated through 280°
- Class of protection IP51
- Operating temperature 5 - 40°C
- Standard accessory:
Battery

Technical Data

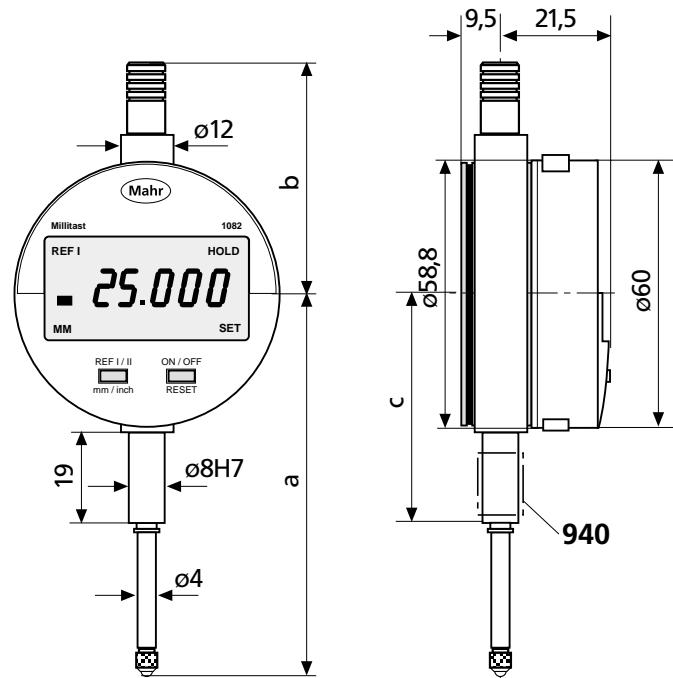
Range mm / inch	Resolution mm / inch	Span of error f_e mm	Measuring force N	Weight g	Order no.
12.5 / .5in	0.01 / .0005in	0.01	0.7 - 0.95	220	4336205
25 / 1in	0.01 / .0005in	0.01	0.6 - 1.1	220	4336206
50 / 2in	0.01 / .0005in	0.02	2.0 - 3.0	400	4336207
100 / 4in	0.01 / .0005in	0.02	2.3 - 4.0	600	4336208
12.5 / .5in	0.001 / .00005in	0.005	0.7 - 0.95	220	4336201
25 / 1in	0.001 / .00005in	0.005	0.6 - 1.1	220	4336200
50 / 2in	0.001 / .00005in	0.012	2.0 - 3.0	430	4336202
100 / 4in	0.001 / .00005in	0.015	2.3 - 4.0	620	4336203

Additional Accessories & Contacts
(Page 4-66 & 4-67)

Digital Indicator 1082

Dimensions

Dimensions mm / inch	a	b	c
12.5 mm / .5in	71.9	53.4	50
25 mm / 1in	84.4	53.4	50
50 mm / 2in	156.5	124	99.5
100 mm / 4in	256.5	174	149.5



Accessories

		Order no.
Battery 3V, Typ CR 2032		4102520
Data Connection Cable (2 m), Opto RS232C with SUB-D jack 9-pin	16 ESv	4102510
Splash Protection Cap		4336424
Mounting Lug	1082 b	4336313
Adapter Bush for adapting mounting shank 8h6 mm to inch bore .375in	940	4310103
Contact Points		901-913
Special Holder		941
Sensor Lever		943

Lifting devices and additional accessories see page 4-42
Contact points see pages 4-66 and 4-67

Digital Indicators 1083/1085 Millitast



Features

Millitast 1083

- Functions:
ON/OFF
RESET (zero setting of display)
PRESET (set buttons can be used to enter any numerical values)
mm/inch-switching
DATA (data transmission in connection with data connection cable)
HOLD (storage of current measuring value)
mm/inch-switch
Reversal of counting direction
Switching of analog display
- Capacitive measuring system, life of battery approx. 2 years
- Max. measuring speed 1.5m/s (60in/s)

- Rate to which measuring values are taken 7 values/s
- Data output:
Opto RS232C (Mahr Duplex)
- Dial indicator can be operated by remote control via intefcae
- High-contrast 6.5 mm liquid crystal display with 4 mm pointer length for better visual perception when checking roundness or flatness as reversal point search when measuring bores
- Function and display section can be rotated through 280°
- Class of protection IP52
- Operating temperature 5 - 40°C
- Standard accessory:
Battery

Millitast 1085

- Design features identical to 1083, but additional functions:
- 3 x PRESET can be stored
 - 2 additional analog displays
 - MAX / MIN memory, for example for reversal point search
 - MAX-MIN for example for checking of roundness and flatness

- ABS: zero setting does not cause reference to current
- LOCK: buttons can be locked to avoid inadvertent adjustment
- Standard accessory:
Battery

Technical Data

	Measuring range mm / inch	Resolution mm/inch	Span of error f_e mm	Measuring force N	Weight g	Order no.
1083	12.5 / .5in	0.001 / .00005in	0.005	0.7-0.95	160	4336800
	25 / 1in	0.001 / .00005in	0.005	0.6-1.1	160	4336801
1085	12.5 / .5in	0.001 / .00005in	0.005	0.7-0.95	160	4336301
	25 / 1in	0.001 / .00005in	0.005	0.6-1.1	160	4336300

Analog display 1083

Readings mm / inch	Display range mm / inch
0.001 / .00005in	± 0.03 / ± .0015in
0.01 / .0005in	± 0.30 / ± .0150in



Analog display 1085

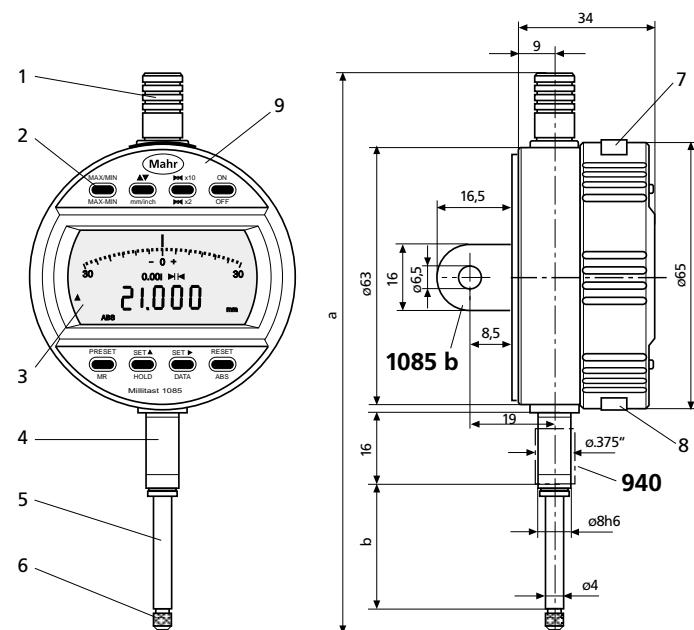
Readings mm / inch	Display range mm / inch
0.001 / .00005in	± 0.03 / ± .0015in
0.002 / .0001in	± 0.06 / ± .0030in
0.01 / .0005in	± 0.30 / ± .0150in
0.02 / .001in	± 0.60 / ± .0300in

Digital Indicators 1083/1085 Millitast

- 1 Protective lifting cap for measuring spindle
- 2 Operating buttons
- 3 Display
- 4 Mounting shank
- 5 Measuring spindle
- 6 Contact point 901
- 7 RS232C-Data output
- 8 Battery compartment
- 9 Swivelling operating and display unit

Dimensions

(mm)	a	b
1083 / 1085 12.5 mm / .5in	125.5	19
1083 / 1085 25 mm / 1in	138	31.5



Accessories

			Order no.
Battery 3V, Type CR 2450			4884464
Data Connection Cable RS232C (2 m) for connection to PC, SUB-D-jack 9-pin	1085 v	4336305	
Data Connection Cable RS 232C (2 m) for connection to peripheral units RS232C SUB-D-jack 9-pin	16 ESv	4102510	
Mounting Lug	1085 b	4336310	
Adapter Bush for adapting mounting shank dia. 8h6 mm to inch bore .375in	940	4310103	

Accessories (cont.)

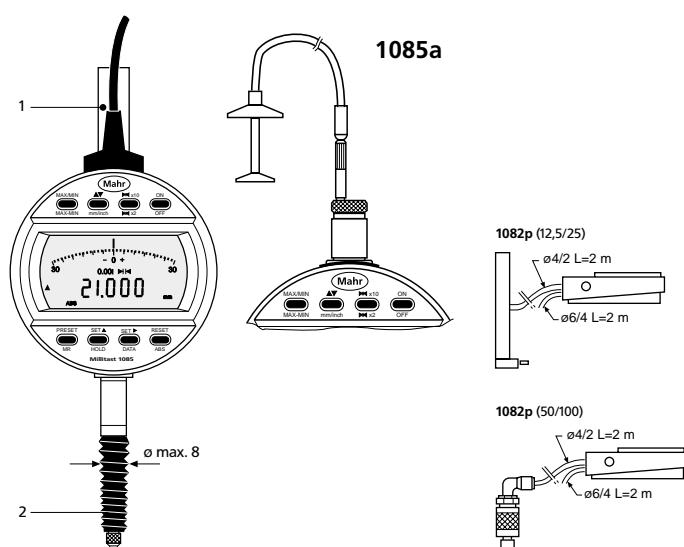
Contact Points	901-913
Special Holder	941
Sensor Lever	943

Additional accessories- see page 4-66

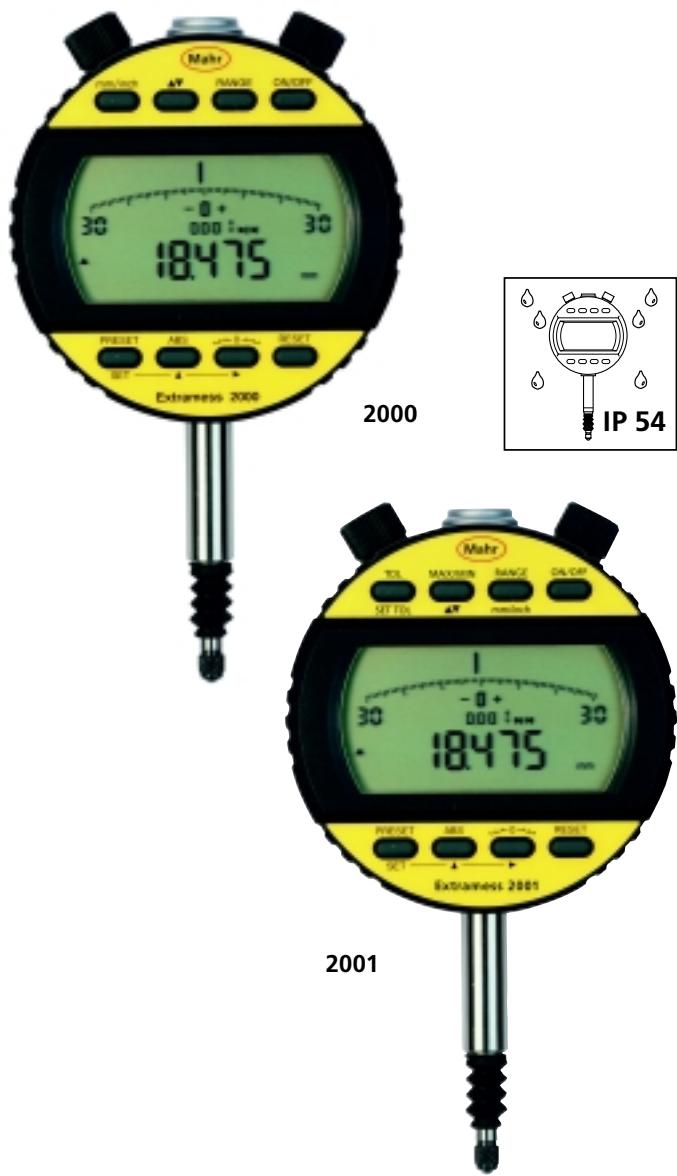
Accessories for data processing see chapter 10

Accessories for 1082, 1083, 1085, μMaxμm XL

			Order no.
1 Protective Cap for ranges 12.5 and 25 mm			4336238
2 Rubber Bellows for ranges 12.5 and 25 mm			4336239
Cable Release	1085 a	4336311	
Pneumatic Lifter for ranges 12.5 and 25 mm	1082 p	4336236	
Pneumatic Lifter for ranges 50 and 100 mm	1082 p	4336230	



Inductive Dial Comparator 2000 / 2001



Features

2000 Extramess

- Functions:
ON/OFF
RESET (zero setting of digital and analog display)
- 0 - (zero setting of analog display)
PRESET (set buttons can be used to enter any numerical value)
mm/inch switching
Reversal of counting direction
RANGE (switching of measuring range and readings)
ABS (reference to elect. zero point)
Display of battery status
- Linearized inductive measuring system
- Power supply via integrated NiMH batteries (40 hours) or via mains adapter
- Rate to which measuring values are taken 20 values/s
- Data output: alternatively OPTO RS232C or Digimatic
- Dial Comparator can be operated by remote control via interface
- High-contrast 6,5 mm liquid crystal display, analog display with 4 mm pointer length for better visual perception when checking roundness or flatness as well as reversal point search when measuring bores
- Function and display section can be rotated through 280°
- Spring for measuring force interchangeable
- Lower stop adjustable
- Class of protection IP 54
- Operating temperature 5 - 40°C
- Standard accessories:
Mains adapter, rubber bellows and spanner for preliminary stroke setting

Extramess 2001

- Features identical to Extramess 2000, but additionally:
- MAX / MIN memory ideal for reversal point search
 - MAX-MIN, for example to check concentricity and flatness
 - TOL (tolerance release)
 - LOCK: buttons can be locked to avoid inadvertent adjustment via output command

- Control output compatible to dial comparators with limit contacts
- Standard accessories:
Mains adapter, rubber bellows and spanner for preliminary stroke setting

Technical Data

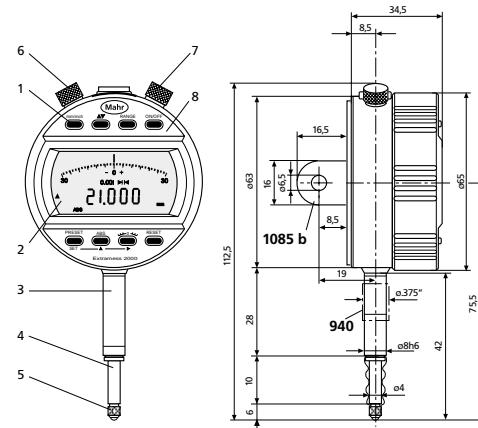
Measuring ranges switchable mm / inch	Selectable resolution and readings mm / inch	Display range of analog display mm / inch	Span of error** µm / inch	Over-travel mm	Measuring force N	Order no.	Order no.
						230 V	115 V
2000	1.8 / .07in 1.8 / .07in 0.8 / .031in	0.001 / .00005in 0.0005 / .00002in 0.0002 / .00001in	± 0.030 / .0015in ± 0.015 / .0006in ± 0.006 / .0003in	0.6 / .000025in 0.6 / .000025in 0.3 / .000012in	2.4 2.4 2.9	0.7 - 0.9	4346000 4346900*
2001	1.8 / .07in 1.8 / .07in 0.8 / .031in	0.001 / .00005in 0.0005 / .00002in 0.0002 / .00001in	± 0.030 / .0015in ± 0.015 / .0006in ± 0.006 / .0003in	0.6 / .000025in 0.6 / .000025in 0.3 / .000012in	2.4 2.4 2.9	0.7 - 0.9	4346100 4346910*

* including Adapter Bush 940

** indicated value + display span of error (≤ 0,5 resolution)

Inductive Dial Comparator 2000 / 2001

- 1 Operating buttons
- 2 Display
- 3 Mounting shank
- 4 Measuring spindle
- 5 Contact Point 901H
- 6 Connection for mains adapter
- 7 Data output
- 8 Swivelling operating and display unit



Control Instrument 2000 sg



Features

- Remote control buttons:
RESET
PRESET
RANGE
- DATA-button for data transmission, optional via Foot switch
- Power supplied by Extramess
- Connection to Extramess via built-in control cable
- Data transmission to PC via optional data connection cable
- Splash water protection according to IP54

Order no. 4346035

Accessories

Data Connecting Cable

Opto RS232C (2 m), SUB-D jack 9-pin	4346020
Data connecting Cable Digimatic (2 m), Flat plug 10-pin	4346021

Software for 2001 to block individual control functions Incl. cable	4346022
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Cable for control output to indicator	4346030
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Hand Lifter with cable release	2000 h	4346010
Pneumatic Lifter	2000 p	4346011

Adjuster for measuring force	2000 m	4346012
Mounting Lug	1085 b	4336310

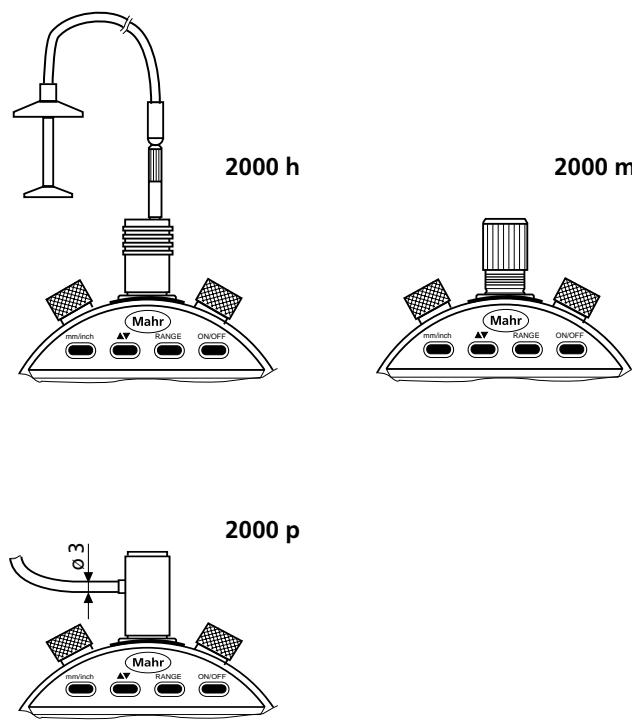
Adapter Bush for adapting mounting shank dia. 8h6 mm to inch bore .375in	940	4310103
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Additional Accessories		Page 4-66
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Contact Points	901-913	
Special Holder	941	

Battery	4884583	
115 V Converter/Charger	4346311	

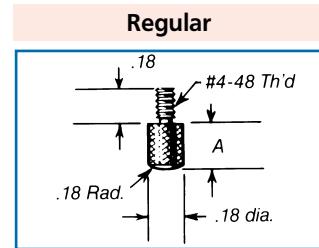
Accessories for data processing see chapter 10



Contact Points

Used with ANSI/AGD Groups 1,2,3,4 Long Range Wetproof Perpendicular and Maxum® Indicators. Points for ANSI Group 0 Indicators - see page 4-15. For Special Points - call Mahr Federal Customer Resource Center.

See pages 4-66 & 4-67 for additional Metric Contact Points.



Hardened Steel

Dimension A	Order number
1/8in	PT-225
1/4	PT-223*
3/8	PT-563
1/2	PT-14
5/8	PT-564**
3/4	PT-31
7/8	PT-201
1	PT-232
1-1/8	PT-305
1-1/4	PT-565
1-3/8	PT-239
1-1/2	PT-50
1-5/8	PT-235
1-3/4	PT-241
1-7/8	PT-100
2	PT-51
2-1/8	PT-243
2-1/4	PT-696
2-3/8	PT-101
2-1/2	PT-245
2-5/8	PT-102
2-3/4	PT-566
2-7/8	PT-247
3	PT-155

Metric***

6mm	EPT-1037-W1
10	EPT-1037-W2
12	EPT-1037-W6
15	EPT-1037-W3
20	EPT-1037-W4
25	EPT-1037-W5

Tungsten Carbide

1/4in	PT-35
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Diamond

1/4in	PT-317
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Set of 8 Steel

1/8 to 1in	PT-116
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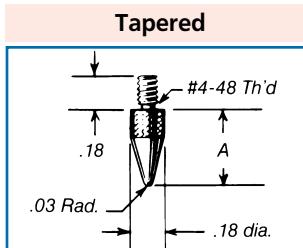
Set of 24 Steel

1/8 to 3in	PT-115
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*PT-223 normally furnished with all Indicators

**PT-564 normally furnished with all Wetproof Indicators

*** All Metric Points have M2.5 thread

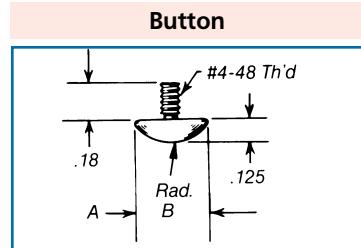


Hardened Steel

Dimension A	Order number
3/16	PT-233
7/16	PT-229
1	PT-253
1-7/16	PT-230
2	PT-231

Tungsten Carbide

7/16in	PT-181
3/4	PT-182
1	PT-183

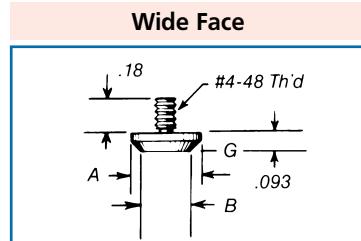


Hardened Steel

Dimension A	Dimension B	Order number
.375in	.250in	PT-227
.500in	.375in	PT-619

Tungsten Carbide

.375in	.250in	PT-120
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Hardened Steel

Dimension A	Dimension B	Order number
.356in	.250in	AL-502
.500	.375	AL-1510
.615	.500	AL-520
.731	.625	AL-44

Metric***

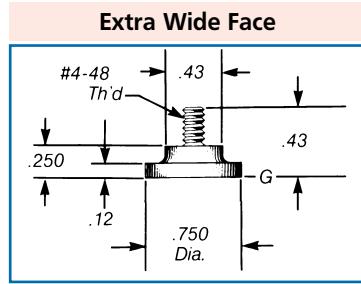
9.04mm	6.35mm	EAL-1020-W1
12.7	9.5	EAL-1020-W2
15.6	12.7	EAL-1020-W3
18.6	15.9	EAL-1020-W4

Tungsten Carbide

.356in	.250in	AL-1730
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Metric***

9.04mm	6.35mm	EAL-1021
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Hardened Steel

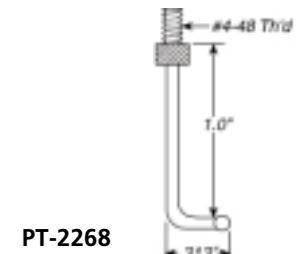
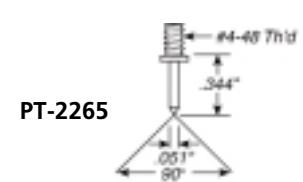
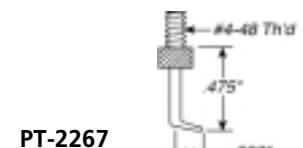
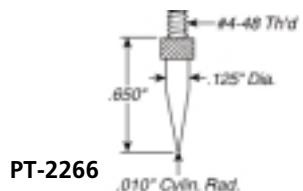
AL-291

Added flexibility for your Mahr Federal dial indicators

Innovative Contact Points make your indicators more versatile.

- Minimize point damage with a shock absorbing contact, without the need for a cushion gear.
- Needle point perfect for checking small areas – etchings, pits and more.
- Chisel point easily adapts to small slots or screw heads.
- Small offset point for narrow recesses – grooves, holes and under ledges.
- Right angle point makes hard to reach grooves easily accessible.

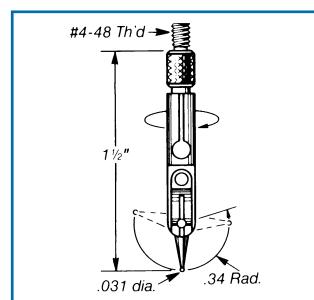
Order number	Description
PT-2263	Shock Absorbing Contact. "O" ring over threads provides a barrier between metal surface and stem, minimizing damage if point is pushed in with excessive force.
PT-2266	Chisel Point Contact for checking small slots. Furnished with a small lock nut for positioning on the indicator.
PT-2267	Small Offset Point Contact. Small tip, .010in radius, permits checking narrow recesses. Furnished with a lock nut for indicator positioning.
PT-2265	Needle Contact for checking into small areas. Correct length for use as a replacement on Mahr Federal 65P-40 depth gage.
PT-2268	Right Angle Contact with a .093in diameter ball for checking hard-to-reach grooves. Right angle allows checking to bottom or to top of a groove when used with a push down action Indicator. Its 1in length makes it long enough to be used with Mahr Federal 75P-50 Series Depth Gages.



Universal

- Ratchet mounting allows choice of 20 positions in arc of 220 degrees.
- Adjusts radially thru 360 degrees.
- Split collar provides snug, dependable fit.

Order number	Description
PT-2197-W2	.031in Dia. Carbide Point Replacement Contacts
PT-187	.081in Dia. Carbide Point
AD-185	Contact Thread Adapter, Adapts M2.5 thread to 4-48 thread (.375in length)

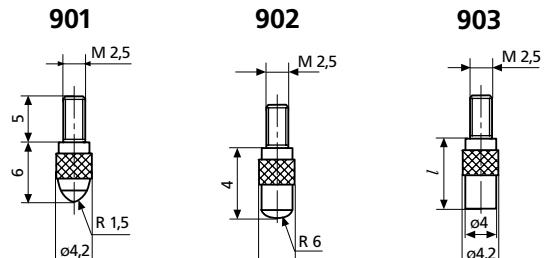


Contact Points for dial indicators and dial comparators

Standard Contact Points 901

Ball dia. 3 mm

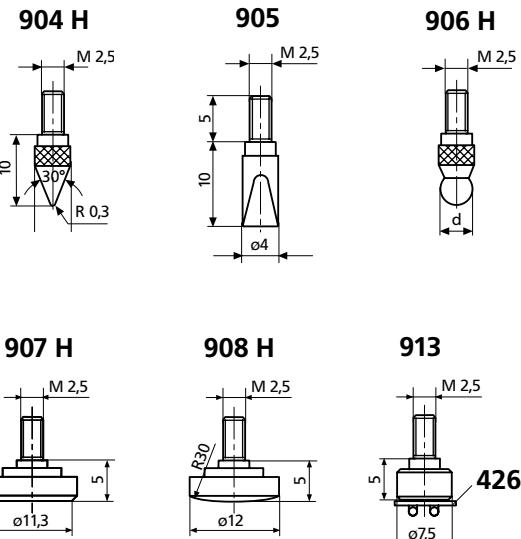
Style	Description	Order number
901	Steel ball	4360001
901H	Carbide ball	4360002
901R	Ruby ball	4360003



Spherical Contact Points 902

Flat Contact Points 903

Length mm	902 steel		902 H Carbide-tipped	903 steel	903 H Carbide-tipped
	Order number	Order number	Order number	Order number	Order number
4	4360007	-	4360070	-	-
6	4360009	-	4360071	4360101	-
8	4360010	4360040	4360072	4360102	-
10	4360011	4360041	4360073	4360103	-
12	4360012	4360042	4360074	4360104	-
15	4360013	4360043	4360075	4360105	-
20	4360014	4360044	4360076	4360106	-
25	4360015	4360045	4360077	4360107	-
30	4360016	4360046	4360300	4360110	-
35	4360017	4360047	4360078	4360108	-
40	4360019	4360049	4360310	4360111	-
45	4360026	4360050	4360303	-	-
50	4360018	4360048	4360079	4360109	-
55	4360031	-	-	-	-
65	4360035	-	-	-	-
75	4360020	-	-	-	-
85	4360036	-	-	-	-
95	4360029	-	-	-	-



Ball Contact Points 906 H

with carbide ball, accuracy ball diameter 0/-6µm

Ball diameter (d) mm	Order number	Ball diameter (d) mm	Order number
1	4360150	6	4360162
1.25	4360151	6.35 (.250in)	4360163
1.5	4360152	6.5	4360164
1.75	4360153	7	4360165
2	4360154	7.5	4360166
2.5	4360155	8	4360167
3	4360156	8.5	4360168
3.5	4360157	9	4360169
4	4360158	10	4360170
4.5	4360159		
5	4360160		
5.5	4360161		

Special Contact Points

Description	Order number
Conical Contact Points, steel, carbide-tipped	904 4360130 904 H 4360131
Wedge-Shaped Contact Points, steel, carbide-tipped	905 4360140 905 H 4360141
Flat Contact Plates, steel, A = 1 cm ² carbide-tipped, dia. 7 mm	907 4360200 907 H 4360201
Spherical Contact Plates, steel, carbide-tipped	908 4360210 908 H 4360211
Flat Contact Point for mounting Pin Gauge Holders 426 M for measuring threads using three-wire method	913 4360400

Dial Indicators Accessories

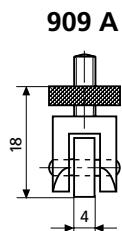


Contact Points for dial indicators and dial comparators (continued)

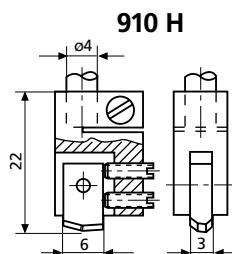
Contact Rollers 909

Concentricity error 2µm

		Order number
cylindrical roller	909 A	4360220
radiused roller, R = 5 mm	909 B	4360221



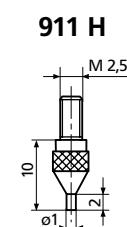
909 A



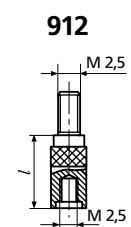
910 H

Measuring Attachment 910 H

		Order number
with carbide wedge adjustable in parallel	910 H	4360230



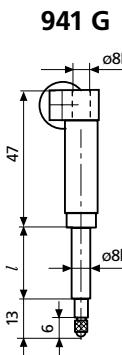
910 H



912

Pin Contact Point 911 H

		Order number
carbide-tipped, dia. 1 mm, flat	911 H	4360240



Measuring Spindle Extensions 912

Length mm	Order number	Length mm	Order number
10	4360250	35	4360254
15	4360251	50	4360255
20	4360252	75	4360256
25	4360253	100	4360257

Special Holders 941

For all types of testing equipment

For placing the dial indicator at a certain distance or angle

Measuring spindle travel 3 mm

Contact Point 901 (interchangeable)

Straight Holder 941 G

Mounting Shank

Angular Holder 941 W

Length mm	Order number	Order no. angle a = 45°	Order no. angle a = 60°	Order no. angle a = 90°
25	4365000	4365010	4365020	4365030
50	4365001	4365011	4365021	4365031
75	4365002	4365012	4365022	4365032

Transmission accuracy for 941 W max. 1%;
for travel 3 mm = 0.03mm

Sensor Lever 943

	Order number
For checking concentricity in bores and on difficult to reach outside diameters. For insertion in measuring stands With lifting device Contact Point 901 interchangeable Travel ± 1 mm	4367000

